



Design Education Forum of Southern Africa

17th DEFSA CONFERENCE

21-22 September 2023

A hybrid conference hosted by

STADIO

HIGHER EDUCATION

VULINDLELA

making new pathways

CONFERENCE PROCEEDINGS



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Introduction

Forward by the editors

This was the first conference that is in hybrid format, which allowed for physical and digital interaction that we so dearly need. As in the past, the two days celebrated new and emerging research by educational practitioners within higher education design contexts in South Africa. The conference aimed to reflect on current design education practices that foreground new and relevant research to advance the development and recognition of design education within the southern African context.

The purposefully crafted conference theme aimed to celebrate the broad conceptual theme of moving forward by exploring new pathways open to interpretation and guided through various subthemes. The conference foregrounded new relevant design education research and sought to contribute towards discourse and research within a South African context. Furthermore, the conference aimed to offer a space to explore student perspectives regarding design education practices within the classroom, curriculum, and broader learning contexts.

The five sub-themes focused on what we are DOING that is new and innovative, how we teach and our students' LEARNING in this ever-changing design education landscape. We also hoped to gauge how MAKING in teaching and research infused what we do and how we think. Moreover, through CONNECTING we hoped to find new pathways, and by CARING we emphasised and explored our human-centred approach to humanity and designing for life.

Conference overview

The conference was presented over a two-day period, with robust discussion on the papers presented. The theme of the conference was *Vulindlela: making new pathways* – the design education community moving forward socially and environmentally, seeking new pathways in a southern African context. The conference was opened by an engaging keynote address by Dr Pfunzo Sidogi. Day one of the conference concluded with industry partners on how DEFSA could foster new pathways. These included the Department of Sports, Arts and Culture; Pan African Design Institute (PADI); IQOQO; and Apple Learn. The conference consisted of five sub-themes, which allowed for parallel sessions and included a session for postgraduate student short paper presentations with the aim to encourage participation of young academics.

The five subthemes of the conference focused on:

- Doing: New pathways in design education

Doing design changed significantly over the decade, and design educators are preparing students for a world of which few educators have experience. Papers are invited that consider design education and change factors, such as technology (e.g., metaverse, 4IR, 5IR, AI, and VR) economic and business factors, and user needs and design enterprise factors.

- Learning: New approaches to design education

Design teaching and learning happen in a fast-changing environment that challenges the way design is taught and curricula are developed. Papers are invited that critically explore and reflect on these challenges and opportunities, such as the learning experiences of design students, options of hybrid teaching, technology in design education, assessment practices, student success, and possible alternative perspectives.

- Making: Practice-based/led or design-led research

Design is ideally positioned to harness the potential of ‘making’ as part of research. Papers are invited that demonstrate and investigate how design making becomes part of knowledge creation in research and postgraduate studies, as well as the nature of this research and practice, challenges, and the potential of such approaches. In this theme, we welcome creative work and artefacts as submissions that demonstrate innovative ways of doing design.

- Connecting: Co-design, co-research, and engaging with communities

Design, design education, and design research take place in a networked environment with various participants and stakeholders, such as industry, communities, and end-users. How can design educators prepare students for these connections? Are we building pathways for co-research and cross-border or global collaboration to move Afrikan design scholarship and practice forward?

- Caring: Inclusivity and design for good

Topics in this theme extend the concepts of human-centred design to that of humanity and life-centred design. The topics consider educating designers for the planet and all people. Papers were invited that critically explore and develop knowledge in design education in areas such as service learning, community partnerships, design activism, and design for the Sustainable Development Goals, etc.

Keynote speaker

Pfunzo Sidogi is an NRF-rated associate professor and head of the Department of Fine and Studio Arts at the Tshwane University of Technology. He is chairperson of the Sasol New Signatures Art Competition and serves on the council of the South African Visual Arts Historians organisation and the board of the Pretoria Arts Association. His newest books are *Mihloti Ya Ntsako: journeys with the Bongzi Dhlomo Collection* (Pretoria: Javett Art Centre at the University of Pretoria 2022), joint-winner of the ‘Best Non-Fiction Monograph’ at the 2023 Humanities and Social Sciences Awards, and *The de-Africanization of African art: towards post-African aesthetics* (New York: Routledge 2022), which he co-edited with Denis Ekpo.

Publication of proceedings

The initial call for abstracts was published on the DEFSA website and circulated to member institutions, resulting in the submission of 78 abstracts. From the abstracts received, the initial review by the editors resulted in 50 abstracts accepted for full papers and 12 abstracts for short papers. All 50 full papers were sent for double-blind peer review. Nine papers were withdrawn. There were 41 full papers presented over the two days at the conference. The short papers were not sent for double-blind peer review, and do not form part of the final conference proceedings. As per DEFSA requirements, all authors were registered for the conference, and in the case of multiple authors, one author was present in the physical or virtual room.

All abstracts and full papers for the conference and subsequent publication were selected using a double-blind peer-review process that ensured that both authors and reviewers remained anonymous during the process. The double-blind peer review of the full paper was completed prior to the conference by a group of academics drawn from nine institutions, representing the disciplines of architecture, communication design, education, fashion design, fine art, graphic design, jewellery design, interior design, photography, and visual studies. A list of the peer reviewers is included in the conference proceedings. Authors received feedback in the form of peer review reports. The improvements and corrections to the papers could be implemented before the conference and were

necessary for acceptance for the conference proceedings. Authors were asked to reflect and report on the reviewers' comments by highlighting their changes in response to the report. Ultimately, 41 papers are published here in the *17th DEFSA Conference Proceedings*.

Peer-review process

The 2023 DEFSA conference peer review group have more than 700 years of combined experience in higher education. The peer-review process for the 17th DEFSA Conference and the publication of the conference proceedings followed two phases. In the first phase, abstracts were submitted and peer reviewed in a blind peer-review process. Approved abstracts were accepted into the conference, and authors requested for full papers. All full papers were submitted by authors went through a double-blind peer-review process before the conference. Reviewers received a review guideline and review reports were completed online in a secure location on the DEFSA website. The papers selected and approved through this process were presented at the conference are now published here in this conference proceedings.

All authors received feedback from two reviewers and completed a report on how the suggestion presented by the reviewers were addressed. All authors were requested to ensure corrections were actioned. The corrections on the final corrected paper were checked against the report presented by the author. All final corrected papers were placed through Turnitin. The editorial team gave final approval for the paper to be accepted into the conference proceedings.

Peer reviewers

The double-blind peer-review process ensures that two people review each abstract and paper and that authors and reviewers who are experts in their fields remain anonymous. Blind paper review was undertaken by 32 reviewers representing various art and design disciplines from 15 South African universities and institutes of private higher education and one international university.

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SESSION 1: Learning





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Undergraduate design students' experiences of decision making in the framing stage of a collaborative design project

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Abstract

Collaboration is recognised as essential in the process of solving large-scale complex problems and can therefore be observed in both the design industry and in design education. As part of design collaboration, design teams go through a process of framing the design problem, proposing potential solutions, and taking the steps required to produce an outcome. Framing, as originally defined by Schön (1999), provides a method to identify the decisions that a design team takes on their journey to establish potential design solutions. Ideally, for a collaboration to be successful design teams need to arrive at a shared frame characterised by a common understanding of the problem, solution, and actions.

This article presents a phenomenological study of the decision-making strategies that undergraduate design students apply in framing concepts during an open-ended, short-term, intense, collaborative design project. Students from multiple campuses who were studying towards degree, diploma, in the first and second-year across a range of design disciplines participated in the project. Data was generated through interviews with a small number of students from different groups on two campuses. The data revealed that students described group decision making in terms of positive and negative emotional experiences as well as the source of stress, conflict, and negotiation. The negative experiences were primarily linked to conflict caused by a lack of trust, poor communication, and uneven workload. Although framing was not explicit, what students described was the struggle to generate and agree on a shared frame. Including collaborative projects in design education is essential to establishing new pathways for student learning. Based on an analysis of student interviews, we propose that certain adjustments to collaborative projects may enhance the learning experience and the design product that students generate. These adjustments include timing the project to accommodate novice design students, explicitly incorporating and addressing the framing process, and including training in soft skills such as team building, leadership, and conflict management.

Keywords: Collaborative design, decision making, design education, framing, teamwork.

Introduction

Group decision-making in collaborative design contexts is fraught with a complex system of negotiations between team members. This article explores how undergraduate design students describe their experience of group decision making during the conceptualising stage of a short-term, intense,

collaborative design project. This article forms part of ongoing institutional research on risk-taking conducted by Giloi, Barry, Burger, Harrison, Krueger, Sheffer, and Walton (2019) and decision-making in open-ended, collaborative design projects. The work of Stumpf and McDonnell (2002), Kleinsmann (2006), McDonnell (2009), and Kleinsmann, Deken, Dong, and Lauche (2012), based on Donald Schön's (1999) Theory of Framing, provide a lens to consider how decisions are made in such a project. In addition, the Theory of Framing serves as an interpretive structure for analysing the data collected from interviews with students who participated in the project.

Inscape is a South African private higher education institution that offers various undergraduate qualifications in a range of design disciplines across multiple campuses in South Africa. Over the past nine years, the institution has run a project that mimics collaborative approaches used in the design industry. The project discussed ran as a week-long, intensive, on-campus project where over 540 students, on four campuses, worked on a brief developed by the institution and an industry partner. The brief challenged students to reimagine carpet design in the 21st century.

The educational objectives of the project included providing an opportunity for peer learning, the chance for students to identify and use their strengths, overcome social and emotional challenges and complete a large design project in a relatively short time frame. Collaborative projects provide the opportunity for students to develop social, technical, and conceptual and leadership skills as well as acquire industry-relevant knowledge. As students at the institution represent a diverse demographic, the project provides an opportunity to interact and work with individuals from different backgrounds and cultures, thereby preparing students for future teamwork in cross-disciplinary teams.

What follows is a brief overview of collaborative design and the identified communication and procedural techniques that design teams use when collaborating. The Theory of Framing, as described by Schön (1999), is employed to identify the components of decision making that a team may use when arriving at design concepts, and how the collaborative process may be influenced by conflict and trust. The subsequent sections in the article provide a description of the educational design project and context, followed by the methodology, data collection, and analysis. Finally, we consider the findings and implications for design education and collaborative projects and provide suggestions for enhancing student experience.

Collaborative design

The role of the individual designer has shifted over time, as designers engage with a range of stakeholders, including other designers, experts, users, and communities. Projects that require teamwork are common in many design industries, and in response to this trend, design education should prepare students to work effectively with and in professional teams (Pontis & van der Waarde 2020). In industry settings, designers may collaborate with fellow designers from the same discipline, as in an architectural company or, as found in the user experience and service design fields, teams may be made up of individuals from different disciplines, countries, and cultures (Watson et al. 2011). Collaborations may be face-to-face, as in the project described in this article, or online.

Collaborative design is described by Kleinsmann (2006) as a process whereby designers share their knowledge about both the design process and the design content. The objective is to create a shared understanding of both aspects, in order to integrate and explore the knowledge and to achieve a larger common objective: the design of a new product.

A number of studies make use of Schön's (1999) theory of framing to more clearly describe and better analyse the collaborative design process. Although Schön (1999) probes the decision making of

individual designers, Stompff, Smulders, and Henze (2016) establish that framing can be applied to interrogate collaborative design as well. The theory, therefore, enables us as researchers to better understand the collaborative design process and highlight the teamwork skills required in such projects. A number of studies of collaboration in professional design practice (Stompff, Smulders & Henze 2016; McDonnell 2018) and in design education (Hey, Caneel & Beckman 2007; Kleinsmann et al. 2012) consider how design teams, with the objective of designing a solution for a complex problem, go about naming and framing potential solutions. Such studies illustrate how framing may be used as an applied theory to inform educational practice.

As learning to make decisions and judgement calls are a critical part of what design students need to learn, analysing how decisions are made in collaborative projects can inform us on how such projects should be incorporated into the design curriculum and how to constructively support students.

Framing

The process of framing is defined by Schön (1999, p. 41) as a non-technical “approach to problem setting and solving”. Schön (1999, p. 40) refers to problem setting, rather than problem solving, as “the process by which we define the decision to be made, the ends to be achieved, and the means that may be chosen”. He describes four phases in the design process: “designers work by naming the relevant factors in the situation, framing a problem in a certain way, making moves toward a solution and evaluating those moves” (Valkenburg & Dorst 1998, p. 251). Naming and framing must occur before a designer or design team can progress to moving and reflecting (Kleinsmann et al. 2012). Designers work iteratively between the phases to frame and reframe the problem setting, propose and evaluate potential solutions and plan and evaluate actions.

When experts from different disciplines collaborate on a design project, knowledge, and experience must be shared efficiently to establish a common understanding. The act of framing, although often not explicit to team members, assists in establishing a common understanding of the design problem, agreeing on a potential solution, and identifying the steps required to generate a product. A simplified version of the conversation pattern used in framing proposed by McDonnell’s (2009) is illustrated in Figure 1. In the framing process members of the team put forward ideas, some ideas are selected, while others are rejected, affirmed or elaborated on, and this requires decision-making. At multiple stages during the design process framing and reframing are offered, communicated and selected. In certain cases, a frame shift may occur when a concept is built on previous concepts (Kleinsmann 2006).

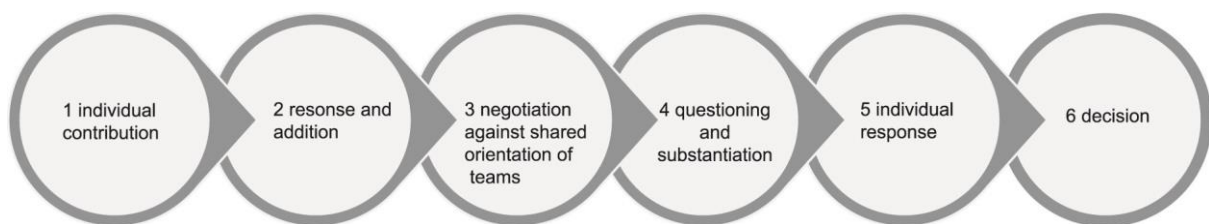


Figure 1: The frame negotiation process (adapted from McDonnell 2009)

Members of the team contribute by seeing the problem and context from their own perspective, as they are influenced by experience, knowledge, expertise, values, and success perception (Hey, Caneel & Beckman 2007). Differences between team members can lead to conflict and if this is combined with a lack of trust, conflict can be destructive (De Dreu & Weingart 2003). In multidisciplinary design

teams, where there is little or no shared disciplinary knowledge and language, trust becomes “the” significant factor for ensuring the effective functioning of the team (Poggenpohl 2009).

The literature cited above provides key concepts that relate to framing in the collaborative design process. These include the actual framing process, how decisions might be negotiated, the role of persuasion and negotiation in achieving agreement, the impact of diversity, and how trust impacts decision making. These concepts were used to analyse data gathered from semi-structured interviews conducted with students who participated in a collaborative design project.

The project

The educational project ran over one week on four of the institution’s campuses. Approximately 540 students from the first and second year of a Bachelor of Design, a BA Digital Marketing and Communication and two design Diploma courses participated. When the project started, first-year students had been attending on-campus classes for three weeks and were, therefore, novice designers. The specialist disciplines that students were studying towards included fashion design, interior design, environmental design, graphic design, ideation, audio-visual design, and marketing and communication.

Student groups were provided with a design brief broken down into two phases. In the first phase, all students completed a basic personality test and were divided into groups of between five to eight team members to achieve a mix of personalities, levels of study, genders, and races. Groups were then tasked with identifying a shared experience or interest, which was reinterpreted as a story that reflected their concerns and interests. Groups transformed the stories into a design that could be used by the partner company to manufacture a rug or carpet. As part of phase one, lecturers ran a workshop on storytelling and the partner company presented information sessions explaining the organisations' goals, values, products, and production methods. In phase one, time was allocated for students to conceptualise and present ideas to a panel of lecturers for approval. The second phase required the groups to reimagine the carpet design as a user experience and to make use of the Belgotex materials to produce prototypes. Lecturers were available during the week for consultation, to run ideas past, confirm information and assist, advise, guide and provide feedback.

Methodology

Valkenburg and Dorst (1998) establish that the design process is complex, and as it includes tacit elements is consequently difficult to observe and describe. Given the complexity of the design process, phenomenology was considered an appropriate methodology for this study as it allows more tacit meanings to be brought to light. The methodology effectively illuminates the lived experience and how participants make sense of that experience. We, as researchers, were interested in discovering how students made decisions during the project, and therefore, adopted the methodology to establish the “phenomenon by exploring it from the perspective of those who have experienced it” (Neubauer, Witkop & Varpio 2019, p. 91).

The authors, in accordance with the ethical clearance granted for the project, canvassed students from two campuses to participate in interviews. Fourteen students agreed to be interviewed and signed informed consent forms, each student was from a different group, and the students were either in the first or second year of study in the degree or diploma and in various disciplines. In most cases, students were interviewed by a researcher who was not their lecturer and who had not engaged with the students for the collaborative project.

Students described framing and decision making in terms of negotiation, conflict, trust, like-mindedness or difference, and personal emotions, rather than focusing on collaboration as an exchange of knowledge. We present in the following section an interpretation of the analysis and examples from the data that relate to framing and follow this with student descriptions of communication, conflict, and trust.

Descriptions of decision-making during framing

Descriptions of framing

Students described a fairly common daily routines in alignment with McDonnell's (2009) frame negotiation process (Figure 1), in that individuals would present concepts to the group and certain ideas would be selected to move forward with, while other ideas were rejected. One or two students would make decisions, or the whole group decided using a democratic approach. The latter approach was described by nine of the fourteen participants and was therefore the more common approach adopted.

The final concept selected by the group was refined and presented to the lecturer panel for approval. Once given the go-ahead, specific tasks were identified and allocated to individual team members or to small groups within the team. The group decision-making process was then repeated at the next meeting with students proposing and presenting new ideas, or iterations, alterations or refinements on previously agreed-on concepts. The iteration could come about when the concept was reinterpreted in a different medium as described by a first-year student.

Most of the time when I draw, I think of something that I draw, and usually it turns out the other way, but in a nice way. So, what I did was when we planned um our design, I went home and like thought of something else. When I came back, I drew it out and when I showed it to them, they were like "Ok, this is cool, actually, we can take this attribute and use it" (S1 01).

Within the team context described by the student, individual expertise was recognised, valued and the frame shift that they proposed was agreed on and the design process could then move forward with the inclusion of this enhancement.

In three cases, groups made the difficult decision to abandon an agreed-on frame and start over. This was as the result of the rejection of a concept by a lecturer or the panel, or if another group had proposed a very similar concept. Reframing was described as confusing, stressful and students were concerned that they might not complete the project on time and might be awarded a low mark. When reframing, groups struggled to motivate themselves and their fellow team members. A first-year student describes the impact of having to reframe.

We had an initial plan, and then, a few hours before we could leave campus, our plan got told that it wasn't good. Um, so we basically had to redo our entire concept. So now it was of, "What do we do? Is it going to work? Is it okay?" (S1 13).

Stompff, Smulders, and Henze (2016) propose that, at the beginning of the reframing process, there is a high level of ambiguity as individuals reflect on what has happened and why, each considering this from their own perspective. In one group, students had become attached to the initial agreed on concept and had difficulty letting go of the concept in order to reframe.

What is significant for design education is that students should be given the time and opportunity to take risks, to frame and reframe, reflect on the experience and learn from failure. Failure should not

have significant consequences for grades and reputation (Giloi et al. 2019), which are significant student concerns.

Communication

When describing the framing process, students mentioned effective communication as a challenge. In face-to-face communication, second-year students in two different groups described how certain team members were “too scared to speak up” or “wouldn’t say what they wanted [...] Maybe they feel as if their opinions won’t be listened to that much” (S1 03).

Students mentioned that not everyone engaged or responded to communications. In groups that experienced poor communication and a lack of commitment, individuals described their days as “stressful”, “messy”, “rough”, “not knowing what was going on”, “very difficult”, “frustrating”, “unclear”, “long hours”, “horrible”, and “hectic”. Poor or no communication from team members was interpreted as a lack of commitment.

Conflict and trust

As indicated previously, student groups were formed to ensure diversity in each team. Some participants described the diverse makeup of their team as positive, while others felt that it made the process of agreeing on concepts more difficult. Stompff, Smulders, and Henze (2016) point out that the more diverse the design team, the more difficult it may be to establish a common frame. A second-year student clearly describes the benefits and challenges of bringing a diverse group of people together to collaborate on the design project.

Everyone has different experience and different backgrounds, different interests as well, and that really kind of translated into the product we designed and made at the end of the day. Everyone had different opinions and it took a lot for us to come grounded into a certain point where we had to agree and that only happens, obviously if you just compromise or just be compassionate about some, you know, people's ideas and once you step away from that and you're able to take in different opinions from every single person, it helps a lot to kind of reach with your final, final design (S1 09).

Attempting to make decisions that brought group members to a common understanding, or creating a shared team frame, was described by students as the source of compromise and conflict. In one group, two second-year team members made all decisions. They described negotiation and conflict and felt that they had to substantiate their ideas and try to persuade others in the group.

They would, they would be like a bit sceptical about the idea, but then you’d have to explain what is your thought process behind it, and they would try and understand it, but they, it’s because it not their way of doing it, so they didn’t really enjoy what they were doing (SI 03).

As indicated in the student’s comment, the negotiation aimed at shifting their peer’s frames was unsuccessful. Hey, Caneel, and Beckman (2007) point out that the framing of a project can continue without individual contributions or buying-in. They propose that, in design education, opportunities should be created to make frames visible or more explicit, that differences between frames should be highlighted, and team members should be trained on how to negotiate and share frames.

The basis of trust

Chiocchio, Forgues, Paradis, and Iordanova (2011) suggest that trust is established when team members behave according to other team members' expectations, and that perceived levels of expertise or competence influence trust. In some groups that connected well, students identified that they had established common ground, shared perspectives, supported the more junior students,

encouraged each other, accepted disagreement and the limits of their own knowledge, and looked up to students who had more experience. In other words, they established and maintained trust, valued each other's expertise and acknowledged different ways of seeing and knowing. However, not all groups established trust. In certain groups, individual contributions were intentionally or unintentionally excluded or withheld. Participants highlighted conflict, uneven and unequal workload, not being heard or not feeling safe enough to express ideas and being teamed up with individuals who were not prepared to accommodate other ways of seeing or doing.

That certain groups struggled to frame the design concept was clearly stated in a number of interviews. Students described how decision-making was ineffective, time-consuming and difficult; groups were disorganised; communication was poor; and students did not trust each other.

Unacceptable behaviour was identified when students did not do what was expected of them, were not committed or when they contributed less than required or expected, this was described by both second and first-year students. "I sat with the work the whole night, while what did you do? And it can bring up fights and arguments, it's horrible" (S1 02).

[T]here wasn't even time to eat [...] like I said, it was like two-man group [...] we were basically doing all the work, while others basically just sat and went with their friends. So, it was constantly busy (S1 13).

Hey, Caneel, and Beckman (2007) outline how the perceived expertise and capability of team members may impact how a project plays out, as well as the quality of the design solution. Certain second-year students highlighted the difficulties of being in a group with a large number of first years, who they described as having little knowledge and expertise. A second-year student described how the first-year students could not do research or correctly cite the material collected.

I had a lot of first years in my group. We were only two second years, the others were first years, so they didn't really know anything [...] they had no clue. We realised that in this project they really couldn't do much (S1 02).

In other groups, the senior students took on more responsibility, provided guidance, and supported the junior students. A first-year student described the second-year student in their group as an experienced and knowledgeable individual who could assist them with the unfamiliar project and new processes.

We had an 'unspoken' group leader [...] because she is a second year, she took the lead, and she was the one who we ran all our ideas by. So, then that's how we were able to say OK this idea is good, this idea can maybe fit if an idea doesn't work [...] She led all the brief discussions, she helped us as first-years to conceptualise further (S1 05).

One second-year student ensured that first-year students had the opportunity for their ideas to be heard and motivated and encouraged them.

Most of our group members were in the first year, so this is a completely new experience to them, and we had to at least guide them along so they don't get really discouraged or irritated along the way (S1 09).

Another second-year student highlighted that on reflection, they would have changed their approach if they had the opportunity to participate in a collaborative project again.

I would communicate more, trust more and plan better. A communal, yes, where everyone supports the risk and can work towards it rather than leaving one person to do it (S1 02).

In the examples above certain second-year students had, of their own initiative, taken on leadership roles to ensure that all students could contribute and thereby reduced the frustration of the experienced and inexperienced students. Their leadership approaches contrasted with other senior students who felt that only they or one other senior student had the knowledge and expertise to make decisions.

Conclusion

In the collaborative project, as described in this article, not all student participants benefited as expected, as certain students and student groups had a negative experience. The negative experiences were strongly shaped by personal and social conflict, poor communication, and uneven participation resulting in a lack of trust. Even in groups that had a positive experience, student teams struggled to arrive at a shared frame and to reframe quickly and effectively when required. Thus, not all of the envisaged educational objectives were achieved. The project was only successful in part in establishing new pathways to prepare students for the world of work and to engage in teams to address complex problems. Based on the literature and the findings, we identified that educators can actively mitigate negative experiences, and facilitate the learning required for effective collaboration and teamwork.

What follows is an outline of the key elements that we intend to address in future projects to enhance student learning. These adaptations can inform educators in other disciplines who wish to incorporate collaborative or team projects in the curriculum.

Training on soft skills

As described in previous sections students should receive training on a number of soft skills to better equip them to manage the challenges of a collaborative project. Chiochio et al. (2011) recommend that before a collaborative project, team-building strategies should be used to build trust and assist team members in developing the skills required to manage conflict. They recommend interventions that would assist with the clarification of roles, managing social interactions, resolving conflict and interpersonal problems as these support essential collaborative skills. Having teams agree on the behavioural norms such as shared workload and “being helpful, active, clear, punctual, trustworthy, respectful, and kind” (Örnekoğlu-Selçuk, Emmanouil & Detand 2021, p. 524) would be beneficial.

Making framing explicit

Making the naming, framing, acting and reflecting processes more explicit to students would enhance the effective management of sharing frames and could encourage students to contribute, evaluate ideas and make decisions in a more structured way.

The timing of projects and identifying strengths

Given the perceptions of both first and second-year students regarding the value that first-year students bring to collaborative design, scheduling the project for later in the year may alleviate the perceptions that first-year students have little to contribute. Kleinsmann et al. (2012) suggest that students should be given time to build their individual skills and expertise before collaborating on projects. Furthermore, they propose that students use storytelling and reflection to identify their current skill level and how this might be used effectively in a project. Although the first-year students did not possess extensive design knowledge, skills, and attributes, these students brought their own unique knowledge, skills, experience and attributes to the process. This was illustrated by students who highlighted for instance, their drawing, language, presentation, and leadership skills, and how

these contributed to the group and the project outcome. In future projects, exercises in which students identify, acknowledge, and share their expertise would be valuable.

Establish team roles

Within teams, a more organised allocation of roles should take place. Poggenpohl (2004) indicates that empathetic individuals with good listening and negotiation skills should facilitate the collaborative design process. As illustrated by the leadership, mentoring and supportive roles that certain second-year students adopted, training senior students in leadership, facilitation, empathy and co-design approaches and more explicitly defining their role could benefit the collaboration process. Ultimately, all students should be equipped to develop and practice effective social skills.

Finally, for students to benefit from collaborative projects, we as educators need to ensure that students are equipped with more than knowledge and skills. Students should be supported in developing the more tacit and social attributes required of designers who will function in multicultural and multidisciplinary teams in the future in unfamiliar contexts.

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Vulindlela – making new pathways

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Humanising online education: A practical approach to teaching theory online

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Abstract

During 2020/1, due to the COVID-19 pandemic, education has had to adapt to a predominantly online learning environment as part of an emergency response strategy that replaced the conventional *Face-to-Face* (F2F) student interaction. Fuelled by the Fourth Industrial Revolution (4IR), we are now steadily moving towards a hybrid-learning environment. The overall notion has been that within the crisis there are also opportunities to evolve, adapt, and make new pathways. However, most local institutions currently rely on a blended method of lecture delivery, which is not as radical.

The study was based on a previous paper submitted and published in 2021 titled 'The role of student-staff partnership and collaborative learning in interior design education'. The 2021 inquiry concluded with a proposal for pilot lectures that were revised and implemented during the academic year 2022 in the Interior Design (ID) Department of a private design college in Johannesburg, South Africa. The 2021 study focused on finding strategies that stimulate student engagement and participation in the theory subject of Critical Studies (CS) within a predominantly online learning environment.

The Second Phase (2022) focus was on testing the above-identified strategies as well as the Project Planners developed for ID1 & 2 towards the end of 2021. Those included shorter lectures; group work and peer review; interactive tutorial sessions and class discussions; setting weekly deadlines; and the use of a variety of media files. A valuable contribution to this paper remains the study and online publication, *Responding to the necessity for change: higher education voices from the south during the COVID-19 crisis* (SU 2021). According to Stellenbosch University (SU 2021), humanising education whilst encouraging ethics of care and digital well-being is paramount to the transition to hybrid education.

Throughout the academic year 2022, revised pilot lectures were implemented along with class observations, anonymous student surveys, and separate focus groups with ID1 & 2 students. Interviews with colleagues were conducted in 2023. The main conclusions include the need for compulsory F2F lectures as well as synchronous or asynchronous online sessions; the use of a digital collaboration platform during class discussions; data light methods and various media; setting weekly deadlines; collaborative and independent learning; site visits; guest lecturers; learning from making mistakes; empathy and understanding; accessibility and language support.

Keywords: Collaborative learning, digital well-being, ethics of care, humanising pedagogy, hybrid learning, student engagement, and participation.

Abbreviations

CS	Critical studies
ERT	Emergency remote teaching
F2F	Face-to-face
HE	Higher education
HL	Hybrid learning
HOD	Head of department
ID	Interior design
SU	Stellenbosch University
TUTS	Tutorials

Introduction

A recent study conducted at the University of Stellenbosch (SU) titled ‘Responding to the necessity for change: higher education voices from the south during the COVID-19 crisis’ by Strydom, Herman, Adendorff, and De Klerk (2021) reflected on the experiences and lessons learned during the emergency remote teaching (ERT) implemented during the COVID-19 crisis, a time of extraordinary social, political and economic challenge (SU 2021). Although we have now left the emergency period and are moving towards a predominantly hybrid¹ model of education, there is a need for a well-designed framework rooted in both theory and experience to inform and support this transition (Adendorff & Herman 2021). Furthermore, De Villiers (2020) emphasises the need to critically reflect on the past and discover new pathways in order to re-design the future of education.

Blended learning,² according to SU, is more of a transition phase to hybrid learning (HL) because it accommodates a traditional and physical classroom within an online world. The progression to HL requires a radical change, a shift in thinking, and alternative pedagogies (Adendorff & Herman 2021). According to Burger, Pegado, Solari, and Talip (2021), the process involves the transition from synchronous³ to asynchronous⁴ learning where students are in charge and become self-regulated, independent learners.

This research attempts to contribute to the body of shared knowledge and practice in the field of Interior Design (ID) higher education (HE). The focus of this study is on a more practical approach of teaching theory within a hybrid learning environment. The inquiry draws on a research conducted in 2021 titled ‘The role of student-staff partnership and collaborative learning in interior design education’ (Author), which concluded with a proposal for pilot lectures that were implemented during the academic year 2022 in the Interior Design Department of a private design college in Johannesburg, South Africa (refer to Appendices A, B, and C). The 2021 study focused on finding strategies that stimulate student engagement and participation in the theory subject of Critical Studies (CS) within a predominantly online learning environment.

¹ *Hybrid learning (HL)* according to SU “is an academic programme or a module that involves shorter periods of on-campus teaching (face to face or F2F) and learning (block contact sessions), supplemented with sustained periods of FOL [fully online learning]” (Burger, Pegado, Solari & Talip 2021, p. 62).

² *Blended learning (BL)* according to SU includes face to face learning well integrated with other technologies, i.e., online learning (Burger et al. 2021).

³ *Synchronous learning* is real-time learning which is either F2F or via an online “learning activity that involves simultaneous engagement between the students and lecturers” (Burger et al. 2021, p. 64).

⁴ *Asynchronous learning* is learning that does not depend on a fixed time and place (not real time), and thus encourages independent learning (Burger et al. 2021).

A valuable contribution to this paper remains the online publication from SU (2021), which is identified as the most relevant and up-to-date publication available on the topic within a local South African context. Common points between the 2021 study and the SU (2021) publication include shorter lectures; group work and peer review; interactive tutorial sessions and online discussions; a variety of media files; and self-paced and self-regulated learning. An interesting addition is language support, ethics of care, digital well-being, and humanising pedagogy (SU 2021).

According to SU (2021), humanising education whilst encouraging ethics of care and digital well-being are paramount to the transition to HL.

The **aim** of this paper is to explore available strategies that can be applied when teaching theory in a hybrid-learning environment in order to encourage student engagement and participation whilst promoting ethics of care and digital well-being.

Objectives

1. Implement pilot lectures during the academic year 2022 based on the main conclusions from the 2021 study, the SU (2021) online publication and department collaboration (refer to Appendices A, B & C)
2. Anonymous student surveys at the beginning of Terms 2, 3 and 4 (refer to Appendix D)
3. Separate focus groups with ID1 & 2 students at the end of the academic year 2022
4. Observations throughout the academic year 2022
5. Interview colleagues (2023)
6. Analyse findings using the method of triangulation.

Literature review

According to SU, we need to design for the transition to HL and create efficient online learning activities whilst considering “content, timing, structure, sequence of learning, assessments, and pedagogical strategies” (Burger et al. 2021, p. 62) whilst remaining flexible, agile, and creative. The aim was to design an appropriate strategy that would be used to transition to a HL environment. An important point raised was the need for language support for both lecturers and students, including writing workshops, assistance, and even podcasts in various local languages (Van der Merwe 2021).

The **following topics** were highlighted during the ERT at SU and discussed throughout the online publication: Ethics of care, digital well-being, designing for meaningful learning experiences, humanising pedagogy, group work, peer review, and language support.

Ethics of care and digital well-being

The ERT implemented at SU and other higher education institutions focused predominantly on transitioning swiftly and efficiently to online education so that students continue the academic year. What we now need to seriously consider is “the impact of such a transition on the general well-being of students and staff” (Strydom, Sinclair & Dunn-Coetzee 2021, p. 23). The authors advocate for a systematic adoption of an “ethics of care” awareness for both lecturers and students with a focus on digital well-being, especially during periods of prolonged online presence and technology usage (Strydom et al. 2021).

Human beings are fulfilled by interaction and contact with others (Strydom et al. 2021). According to Bergman (2020), social isolation during the pandemic led to some loss of our sense of self, mostly because human beings need to feel recognised in the eyes of others in order to be fulfilled and happy (Bergman 2020). According to SU, the COVID-19 pandemic and the ERT that most educational

institutions imposed on students led to feelings of isolation, depression, and anxiety (Strydom et al. 2021).

The various points discussed below are strategies that should be used to alleviate the above-mentioned conditions.

Designing for meaningful learning experiences

Volschenk, Brits, Foiret, and Pinetown (2021, p. 57) maintain that “active listening to, [and] consideration” of students is an important component of care and may even lessen anxiety. Volschenk et al. (2021, p. 58) advocate for “designing for meaningful learning experiences” based on student engagement, care, and re-considered learning outcomes that better fit the new model of learning.

Breaking one lesson into smaller bites, providing clear instructions and outcomes in order to ensure independent and competent learning. Using data light methods (PDF, recorded audio notes, and compressed video files) to ensure the majority of students are reached as well as “collaborative learning experiences” (Volschenk et al. 2021, p. 58) such as forums, workshops, group work, and presentations.

Mutual vulnerability

According to Jacobs (2021), humanising pedagogy may help alleviate feelings of uncertainty and anxiety. The author talks about “(re)humanising education through relationships of trust, care, [and] [...] respect” (Jacobs 2021, p. 32). Humanising pedagogy is about respecting and honouring each others’ backgrounds, identities, and experiences. The author stresses that having compassion for each other may alleviate some of the anxiety caused by the pandemic, as well as moving forward to a hybrid way of learning (Jacobs 2021).

Social inequality in a country like South Africa is an important challenge to consider when discussing hybrid education. Strydom and De Klerk (2021, p. 39) have identified the “so-called digital divide” as well as a “lack of digital literacy” in students from different social and economic backgrounds. Therefore, if we would like to humanise education, we need to find a way to be more inclusive, diverse, and accessible. In this context educators value the student-teacher relationship and online learning is more than just transmitting knowledge. Students are seen as “co-investigators in dialogue with their teachers” (Strydom & De Klerk 2021, p. 40) and learning outcomes focus on critical thinking and problem solving.

Flexible asynchronous learning where students feel encouraged to choose their own pace of learning may result in higher student engagement. Self-paced and self-regulated learning encourages embodied learning, in online education this means that students engage with a variety of media files and interactive tutorial sessions, including various critical thinking exercises that become part of the overall assessment (Strydom et al. 2021).

Humanising pedagogy

According to Volschenk, Rootman-Le Grange, and Adendorff (2021), most lecturers during ERT struggled with student engagement as a result of not experiencing the same kind of physical classroom rapport with their students, which was usually immediate and included body language and facial expressions. Experiences like awkward silences, lack of spontaneous feedback, and disconnection were the norm (Volschenk et al. 2021).

Humanising education is an important strategy when engaging students using an online platform. Here, students are seen as co-creators of knowledge, and their respective histories and experiences are valued and respected. Collaborating with others may help students deal with feelings of isolation as well as learn new concepts (Volschenk et al. 2021).

Students do better if they feel supported and cared for by their lecturer. Therefore, online education is not only about uploading material that is readily available to students. Lecturers should aim to actively engage their students and look for strategies that help student and lecturer engagement within an online platform. Here, active communication with students through various channels and giving regular feedback play an important part (Volschenk et al. 2021).

Group work and peer review

Clift, Burger, and De Villiers (2021) have observed the value of group work and peer review during the time of ERT. The authors acknowledge that although there is a certain stigma regarding peer review as not being taken seriously enough by learners, it can be seen as a way of engaging students to work with each other and broaden their perspectives (Clift et al. 2021).

Running group workshops with students and letting them evaluate each other while providing solid arguments, has encouraged student independence of learning. A major concern with group work is that weaker students usually benefit from the work of their stronger colleagues, also known as “freeloading” (Clift et al. 2021, p. 77). The authors discuss in length assessment methods they have used in order to combat this situation as well as to ensure students remain engaged and learn from each other (Clift et al. 2021).

Research design

The main focus is on the practical and case study approach of teaching theory to ID students in a private college environment, where the author of this paper teaches Critical Studies (CS) to first and second-year ID students. The approach of inquiry uses qualitative research methods within a constructivist worldview where the researcher who is also the lecturer has observed students’ (participants’) behaviours by engaging with their activities. Data collection included observing and collaborating with students during lectures, anonymous student surveys, and open-ended interviews with colleagues. Classes are small, between 30 and 40 students per class, which makes it appropriate for this kind of practice-based and participatory research.

The 2022 project relied upon department collaboration, the HOD of the ID Department, the CS lecturer for the third year, and other studio lecturers. On Friday, 3 December 2021, the ID department conducted a 4-6 hour workshop on planning the academic year 2022 across all subjects. The main conclusions relating to the subject of CS included a need for a more practical approach to facilitate the subject of CS; considering local community engagement projects; site visits; ID department collaboration and guest lecturing. The above points were considered and included in the project planners for 2022.

The planning for CS, as well as the 2022 research, was approved by the HOD of the ID department. Following the main findings of the research conducted in 2021 (refer to Appendix A), the staff workshop, and the SU publication, proposed pilot lectures for ID 1 & 2 as well as the student surveys were revised accordingly (refer to Appendices B, C & D).

Ethics in research

Key ethical issues in research that were considered include anonymity, consent, confidentiality, and debriefing. Both ID1 & 2 students were approached at the beginning of the academic year 2022, introduced to the aims of the research, and asked if willing to participate by signing a consent form using Google forms (refer to Appendix E). Survey anonymity was guaranteed; for the focus groups, confidentiality was agreed and no student names were mentioned. The right to withdraw at any time was acknowledged as well as the assurance that participation is a choice and would not reflect on academic performance.

Analysis and discussion

Below is a discussion based on the main findings from the surveys and focus groups with students; class observations; and interviews with colleagues. All lectures in 2022 were F2F, as well as recorded online. Students were given the choice to attend either F2F or online.

First-year students were enthusiastic and regular at attending F2F lectures throughout the academic year 2022, about 60 to 70%, and the rest followed online. Second years appeared more independent and expressed that a theory subject can be attended remotely, with a few regular students attending out of 30. Based on the surveys students from both years greatly benefitted from F2F lectures, peer interactions, and site visits. ID2 especially enjoyed and found great value in class discussions during tutorial sessions where they were given various exercises or readings to prepare; the same can also be said for the group work, oral presentations, and guest lecturers.

Students attending online complained that they were often distracted with other activities and not as engaged and 'present' during class time. In addition, during 2021/2 we had an increase in reports of students suffering from anxiety and various mental disorders. As a result, lecturers in our department struggled to achieve the usual lively classroom discussions that would naturally happen before the COVID-19 pandemic. A common struggle amongst lecturers was delivering lectures to both online and F2F students at the same time. According to a colleague, it is "one of the most difficult parts of teaching both [...] I would choose one, either online or F2F. Also, from the students' point of view [...] it's also challenging for them".

According to a colleague who is an Associate Professor in the Architectural and Engineering Design Technology department at South Texas College and has experience in hybrid and fully online education for the last decade, for hybrid education to work we need a combination of compulsory F2F lectures as well as online sessions (synchronous or asynchronous). Also, it is vital to integrate accessibility into the syllabus, i.e., making educational material accessible for all types of students including some disabilities.

Ethics of care and digital well-being

Speaking to colleagues, we are in agreement that we need to "*foster a sense of safety and security, students learn better when they feel seen and valued*" (colleague). According to an online student in the survey (ID1), I do "*make an effort to make the online students feel inclusive and part of the lessons*". Also, "*the lessons are clear as she is always close to her speaker. She explains the brief in detail and also ensures we all understand before moving on*". Another student (ID2): "*Lessons are well structured and information is delivered well*".

On being friendly and approachable: “Alex is always extremely helpful and friendly when I approach her for help or any questions” (ID2 student). “Alex is really competent and knowledgeable about all the topics discussed. And super helpful and friendly, will miss her next year” (ID2 student).

Shorter lectures

Although, not always easy with the amount of theory and limited time with students, an effort was made to have several easy-to-download files, 30 to 40 minutes of recorded lectures, detailed briefs, and supporting material. Students who answered the survey agreed they preferred shorter +/- 30 min lectures; colleagues were also in agreement stating that “*we need shorter bursts of concentration [...] followed by longer discussions and question sessions*”.

A suggestion for 2023 was to pre-record some of the content giving students the opportunity to go over the material in their own time before the lecture in order to free more time for class discussions (independent asynchronous learning).

Cameras on for the first 15 minutes and during presentations

Although we as a department agree that “*cameras on for students at certain times will make a real big difference not just for them but for us*” (colleague) we were unsuccessful at getting our students to voluntarily turn on their cameras. When asked in a survey, the top reasons given were data issues, anxiety, not having a camera. That resulted in poor-quality presentations with the majority reading and not showing their faces. For 2023, students were instructed to pre-recorded their presentations using a video.

Miro and informal class discussions

The use of Miro (visual collaboration platform) was a great success, prompting students to actively engage and participate during class discussions. The same experience was shared within the ID department, especially studio lecturers. F2F students have one-hour tutorial session (TUTS) dedicated to class exercises working in smaller groups in addition to their weekly CS lecture. Those sessions were reserved for informal class discussions, where students were instructed to prepare a reading, a video, or answer questions related to the theory discussed in class.

Even though a few students participated voluntarily, when asked directly most had a prepared answer. In the surveys both ID1 and ID2 students felt encouraged to participate in class discussions. According to an ID2 student: “*Alex always encouraged me to talk and we had a lot of interesting discussions, going to miss her as my CS lecturer*”.

Miro board, ID1

https://miro.com/welcomeonboard/UzlwclVCUzFkZm1vY25QR0k0QzM2RTBUWktyTXE2UkZwbFNyN1E5QXRpek16NjdpUFhkUWphSThKdUY3OVBMZHwzNDU4NzY0NTQ0MTU4NzY1Mjc5fDI=?share_link_id=362106045802

Miro board, ID2

https://miro.com/welcomeonboard/RDBtSjVmSU90R244QmNnOEtnbWIOVExhSmh0WnVIZzJZS2RTZ2dKMTVoVzMyc1BudDdUQ2JtaUZNRGtINU1RTXwzNDU4NzY0NTQ0MTU4NzY1Mjc5fDI=?share_link_id=576021835550

Use more visual examples from various sources (images, videos, movies, interviews, and examples from social media)

A wide selection of visual examples and digital media (images, videos, and interviews) were included in lectures as well as informal class discussions during TUTS. That worked well, and students felt more encouraged to engage during the lecture time, also confirmed by the student surveys.

Weekly deadlines

Briefs & assessments included several units of submission each unit contributing in content towards the final essay submission worth 50%. For example, a summary, a mind map, and reading presentations related to the final essay submission. Those worked well and coupled with the TUTS class discussions (also part of the assessment) contributed towards a better understanding of the theory and a successful essay submission.

Teamwork – group projects and presentations

At least one assignment per term was in the form of a group presentation, including a peer review opportunity. Although generally, students appreciated the value of group work (also confirmed by the student surveys and the focus group), the overall struggle was the presentation with the majority of students reading from their notes. Pre-recorded video presentations were proposed for 2023.

Site visits

As a department, and especially studio lecturers we do have a culture of taking students to site. Students who attended the site visit once a term found those beneficial (also confirmed by the student surveys and focus group). Site visits are an important part of the syllabus and relate to the final essay submission, therefore they need to be included in the brief and assessment criteria.

Guest lecturers

I did struggle with time to get a guest lecturer every term and the few sessions that we had throughout the academic year 2022 had mixed reviews and participation. The main concern for professionals and fellow lecturers was finding the time. A colleague suggested we do a department exchange, *“one for one, I take your 2 hours and you take mine”*

Learning from mistakes

Some of the submissions throughout the academic year 2022 were presented in front of peers and the lecturer. Immediate feedback was given and students had some time to make changes until the final submission at midnight. Also, for some of the smaller units of submission throughout the term students were encouraged to go over the feedback, make corrections, and re-submit. Providing feedback directly in Word also worked well, however the online platform that we currently use needs to be re-designed in order to accommodate for that.

Conclusion

Now is the time to look forward to the future and apply some of the knowledge and experience gained in a “post-pandemic world of higher education” (Strydom & De Klerk 2021, p. 44). In each crisis, there is also an opportunity, but that requires us to be brave and change our current way of thinking (Jacobs 2021, p. 33).

Education is about inspiring students to find their own knowledge, meaning, and voice whilst remaining critical of their environment. The process involves the transition from synchronous to

asynchronous learning where students are in charge and become self-regulated, independent learners (Burger et al. 2021). Assignments in a hybrid world should offer a more critical engagement with the theory coupled with problem-solving and presentation skills that require students to “apply, analyse, and evaluate concepts” (Volschenk et al. 2021, p. 59).

According to the Programme Overview for CS, the aim of the subject is to understand the coursework whilst enabling critical and analytical skills as well as initiating students into a personalised engagement with critical and analytical skills in response to relevant discourse in the visual arts. Reflecting on the year 2022, we managed to achieve a good level of class engagement, critical thinking, and participation. Teamwork, peer reviews, presentations, class discussions, weekly deadlines, the use of Miro, site visits, guest lecturers, and learning from mistakes were all major contributors.

Humanising education is an important strategy to use when engaging students using an online platform. Here, students are seen as co-creators of knowledge, and their respective histories and experiences are valued and respected. Moving towards a hybrid model of education for the subject of CS, it is important to balance online lectures (synchronous or asynchronous) with compulsory F2F sessions including site visits, guest lectures, class discussions, tutorial sessions, and collaborative learning including group work. For that model to work, online lectures including pre-recorded sessions should remain exclusively online, and F2F sessions although compulsory, can be attended both online and F2F to accommodate online students.

Most importantly, we need to be more inclusive, diverse, and accessible by breaking one lesson into smaller bites; providing clear instructions and outcomes to ensure independent and competent learning; using data light methods and a variety of media files so that lecture material is easily accessible and readily available whilst providing appropriate student and language support, empathy and understanding.

Lastly, it is important to note that fully online education is a key part of HL and deserves proper attention, a subject for another discussion and another paper.

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Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Who authors learning? Teaching design with intelligent technology

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Abstract

African philosophies of Ubuntu prioritise humanising the community of learning. Contextualising Ubuntu within the emerging Fifth Industrial Revolution (5IR) creates a tension between algorithms and the craft of design scholarship. The effect of the 5IR, while being more human-centred, is also unpredictable in terms of how technology replaces or automates human activity. This has led students to use technology tools to shortcut or circumvent activities that result in deep or transformative learning. Within the context of design education, this threatens the aptitudes and dispositions needed for engaging with the design process with the goal of establishing critical and creative authorship. The threat of automation has destabilised learning systems and structures to the point where such authorship holds the possibility of being appropriated by artificial intelligence (AI). The challenge for educators is how do we create the curricula, material, and learning activities that interpolate students to actively engage in the processes of learning.

This paper draws on post-structural paradigm as it seeks to reposition the formative debates around the perceived threat AI poses to learning, taking cognizance of the ethical concerns regarding authorship, and developing the capacity for creative and cognitive authorship across the various design disciplines. Where AI, such as ChatGPT or Google's Bard, surveys the known in order to respond to queries and seems to imitate to create. However, the requirements of learning activities such as research or creation/design forge a path through the unknown, using technology as a tool rather than as a substitute for human activity. The paper will offer reflection as discourse on how to reorientate one's practice against the cardinal framework of teaching and learning in design education. It concludes that cardinal directions embedded within human-centred learning, Ubuntu philosophy, and the criteria for authorship, despite the disruption of AI, still orientate towards the primary goal of student learning.

Keywords: Authorship, design education, human-centred learning, Ubuntu.

Introduction

The term artificial intelligence (AI) may be defined as “the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings” (Copeland 2023). Much of what we understand about the potential of AI is derived from the work of Alan Turing (1950, p. 435), who famously defined the discipline of AI as “an imitation game”. The development of smart algorithms, chatbots, and even voice-activated virtual assistants has laid the groundwork for increased human-technology interfacing in our living, working, and learning (see, for example, Sidley 2023 and Ormond 2023).

The return to a more “normal” classroom after the COVID-19 pandemic has been re-disrupted by the public release of generative AI. The ongoing debates, fears, and discussion continue as the capabilities

of generative AI is explored and tested, and further developed. In many disruptions, some faculty remain reactive and uncertain about how to incorporate growing technology disruptions within their practice in a consistent, adaptive, and academically credible way. This paper will offer exploration and reflection as discourse on how to reorientate one's practice against the cardinal framework of teaching and learning in design education. The aspirations of developing future designers, triggering student learning and professional practice in an African context, are held as fundamental to this paper.

Methods

The paper draws on Post-Structuralist Theory to determine the impact of AI on teaching and learning in design education. Where structuralism proposes an inflexible distinction between, and hierarchical organisation of, phenomena, post-structuralism destabilises such notions by disrupting the influence of boundaries and hierarchies. Gilles Deleuze and Félix Guattari (2004) propose how post-structuralism aligns with the cardinal framework necessary for mapping the teaching and learning journey that education systems are traversing. Kairiené advocates for Deleuze and Guattari's (2020, p. 104) approach that challenges fixed notions of subjectivity and hierarchy in proposing a nomadic, rhizomatic form of thinking that reimagines stakeholder roles in teaching and learning. Deleuzian logic, therefore, no longer regards higher education as exclusive, but rather as part of a multifaceted collection of meaning-making systems (Kairiené 2020, p. 106). Consequently, AI disruption allows stakeholders to navigate multiple learning journeys simultaneously (and collaboratively) but offers little sense of certainty of location or direction.

Post-structuralism further assumes that agency is important for the learning, well-being and relationships of educators and their students. In addition, Heikkilä (2022) characterises professional work as requiring agency to be enacted within one's domain of expertise. Thus, professional agency, within the context of teaching and learning, relies on purposeful direction, stability, and the power to act and choose actions that result in achieving outcomes through learning. Significant disruptions – like the COVID-19 pandemic or new technologies such as generative AI – seem to threaten both well-being and agency because choice becomes constrained or reactive. However, post-structuralism questions the assumption of professional agency as resting squarely on the shoulders of the individual educator and claims a more entangled and relational approach (Heikkilä 2022). This approach aligns with the African philosophy of Ubuntu, as expressed by authors like Waghid (2020). Teaching and learning that is informed by Ubuntu includes balancing concepts of human interdependence and humaneness with practices that result in purposive, responsible, collaborative, and mindful activity (Waghid 2020, p. 1).

As design faculty seeking to incorporate practices of professionalism, agency, and accounting for practice in our own narratives, we explore the discourse and evidence around recent developments of generative AI and the potential impact on the practice of design education. As faculty, we hold space for responsive, reflective practice and emergent thinking from a human-centred learning approach in an African higher education context. How the cardinal values of education are lived out in teaching and learning practices in a consistent, adaptive, and academically credible way remains an ongoing dynamic dialogue in the scholarship of teaching and learning.

Incorporating Ubuntu principles within the context of the Fifth Industrial Revolution (5IR)

Industrial Revolutions, largely through technology¹ changes, are characterised by a fundamental change in how we live, work, and relate to one another. The Fourth Industrial Revolution (4IR), first

¹ Technology here is used in the sense of tools and techniques, i.e., “scientific knowledge used in practical ways in industry” (Oxford Learner's Dictionaries 2023)

defined by Schwab (2016), is still diffusing, and emerging as disruptive and converging technologies throughout African economics. While there is no single or definitive narrative of the 4th IR in Africa, reflecting the diverse needs and aspirations of African people and communities, there are calls for more inclusive and participatory approaches to Africa's participation in the world economy (see, for example, Yende 2021). There have always been concerns that Africa may "lose its sovereignty and identity in the face of globalisation and digitalisation", as a type of neo-colonisation. Still, the new 4IR raises many questions about how human-beneficial the new IRs are, given the sustainability concerns, employment changes, exploitation and widening inequality evident and the digital divide. For example, Authors like Khoa, Gip, Guchait, and Wang (2023) have described the rise of robotisation in the hospitality industry, in which a key consideration is whether competition (i.e., robots take over all human tasks) or collaboration (i.e., humans collaborate closely with robots to perform work better) will define the future. Similar discourse pervades discussions regarding AI, with several raising concerns about AI displacing humans in jobs and enabling students to engage AI in completing assessments in ways that put Academic integrity at risk.

Ubuntu is an African philosophy that emphasises the interconnectedness of humanity and the importance of community. It is often translated as "humanity towards others" or "I am because we are" (Kotze 2023; Jahnke 2021). The philosophy of Ubuntu has been applied to many fields, including politics, education, and technology. In recent years, there has been growing interest in applying Ubuntu to AI (Jahnke 2021). The conceptual approach is that AI should be designed to reflect more inclusive human values and promote human well-being (Mhlambi 2020; 2023; Jahnke 2021). Sabelo Mhlambi (2020, p. 1) argues that the traditional Western view of personhood is based on rationality and that "truth could be rationally deduced through formal rules of logic". This Western approach has largely informed the development of AI, and therefore, perpetuates individualistic approaches (humanness as the individual's ability to arrive at the truth by logical deduction). The outcome of this philosophy leads to a competitive approach "to build a machine that would match or surpass humans in reasoning or rational thinking" (Jahnke 2021). In contrast, Ubuntu, which is the basis of African philosophy, defines a person from the perspective of their social relationships, as "fundamentally relational", where "a person is a person through other persons" (Mhlambi 2020, p. 3).

The Fifth Industrial Revolution (5IR) is often positioned as encompassing the notion of harmonious human-machine collaborations, with a specific focus on improving the well-being of the humans affected by the 5IR. From discussions on climate change to health, authors like Noble et al. (2022, p. 199) argue that this creates a path for "a (r)evolution in thinking about and leveraging human-machine collaborations for greater societal well-being". In truth, these types of discussions of the 5IR remain aspirational and hopeful. In this discourse, the emergence, and applications of generative AI remain optimistic, focusing on the as-yet unrealised potential to improve human-technology collaborations. Incorporating the values of Ubuntu would align with these aspirations as we as Africans seek to influence the 5IR emergence in Africa.

Perceived threats and opportunities from AI disruption

All industrial revolutions include shifts in jobs. Ormond (2023) cites an IBE (2021) survey, which found that 62% of South Africans expressed concern that AI would lead to unemployment. This and concerns regarding academic integrity and authentic assessment remain the most significant perceived threats from AI disruption.

OpenAI (2022) has been developing GPT (generative pre-train) since 2018. Since its launch in November 2022, ChatGPT-3 reached 100 million active users in January (OpenAI 2022), just two months after its release, making it the fastest-growing consumer app in history.² Since then, GPT-4 has been integrated into a variety of platforms and applications, including websites, messaging apps,

² OpenAI's GPT-4 is the largest language model created to date and was released on March 14 2023.

virtual assistants, and other AI applications. This release of ChatGPT-3 accelerated the release of Microsoft Bing and Google's Bard. Ormond (2023) points out that all technology has unforeseen consequences, and that AI is not a public good, as it is developed by corporations for profit. Actively engaging with and shaping the implementation of new technologies seems key to harnessing the potential benefits. With the distribution of new generative AI technologies, such as ChatGPT, Bard, and Bing, feedback loops, and experimental opportunities are available. OpenAI (2022) publicly discloses limitations to ChatGPT and states, therefore, that it released ChatGPT to get users' feedback and improve the moderation of their AI.

Mollick and Mollick (2022, p. 1) were among the earliest educators to argue that "AI can be used to overcome three barriers to learning in the classroom: improving transfer, breaking the illusion of explanatory depth, and training students to critically evaluate explanations". Baidoo-Anu and Owusu Ansah (2023) point out that the ability of ChatGPT to perform complex tasks within the field of education has caused mixed feelings among educators. The perceived competence of ChatGPT-3 on certain examinations (Terwiesch 2023) has caused consternation amongst some academics. Still, we agree with Oppenheimer (2023) that while AI like ChatGPT could make it easier for some students to cheat, "it doesn't fundamentally change the integrity dynamics in higher education".

Baidoo-Anu and Owusu Ansah (2023, p. 1) argue that the potential benefits of ChatGPT include but are not limited to the "promotion of personalised and interactive learning, generating prompts for formative assessment activities that provide ongoing feedback to inform teaching and learning, among others". Yet these authors also point out some inherent limitations in the ChatGPT AI, such as generating wrong or fabricated information, biases in data training, which may augment existing biases, privacy issues, among other elements. Several authors, including Mhlangu (2023), argue that the use of ChatGPT in education requires respect for privacy, fairness and non-discrimination, and transparency in the use of ChatGPT.

Authorship and AI

The first cardinal value relates to authorship, and the potential for collaborative authorship. In weighing the degree to which AI establishes itself as coming alongside human endeavours in multiple contexts, and in light of the perceived threats and opportunities outlined above, one of the key considerations relating to creative and critical outputs is the question of authorship. Debates concerning authorship have extended across a spectrum from the philosophical to the legal, and some of these will be highlighted here as they frame the intrinsic need to validate the products of human critical and creative thought and how AI would be perceived in relation to that.

Within the context of philosophy, authorship is rooted in the humanist view that humanity is "the measure of all things" (Braidotti 2013, p. 2), and that the human capacity to think and create colonises the scope – the breadth and the depth – of authorship. Edmund Wilson (1936, p. 176) adds to this humanist view by stating that it is the author's spirit, their "Impulses and emotions" that ultimately fix their creative ownership over the embodied work. However, the poststructuralist, postmodernist and posthumanist views seek to challenge such notions of absolute human authorship. Of particular note is the work of Roland Barthes. In his 1967 essay 'The death of the author' (reproduced in *Image-Music-Text* in 1977), Barthes subverted author as an absolute originator of meaning – that it was not the author's history, biography and intentions that informed how their work would be received and understood. This idea opened the door for more readerly views, which have, in turn, contributed to the understanding that meaning making is collaborative, enacted by both human and nonhuman stakeholders.

Barthes' view on the matter of authorship is not regarded as having absolutely shaped twenty-first-century thinking about authorship. Rather, he posits that the collaborative potential of creative and critical engagement is worth noting as it questions who has power over the act of creating. Darren

Hick (2014, p. 151) agrees with this understanding by proposing the following definition of authorship as it is connected to power:

In short, authorship implies responsibility, and responsibility here (as in any arena) implies power. So, what gives an author this power? [...] Power comes, at least in part, from recognition by others of that power [...] We recognise authors as having power in the creation of their own works, and we do not recognise the power of artistic usurpers.

Hick is proposing here that authorship is an act of negotiation between those who intellectually engage with and create, and those who recognise the source of the creative output while discrediting imitators.

Hick's above definition connects well with the legalistic views of authorship as they pertain to copyright and the emerging concerns regarding AI and authorship. The Committee of Publication Ethics (COPE) is the first point of departure here. Alysa Levene (2023) of COPE considers the importance of the question of authorship in relation to copyright when she posits that "definitions like authorship matter" and that "[it] matters who (and what) an author is, and whether they can answer for the ethics and trustworthiness of their work". Levene's argument here is based on her assertion that, unlike humans, AI systems cannot be held responsible for the work they represent. Levene (2023) states that "[a] bot – however well trained, and with whatever degree of clarity that is brought by distance from the messy, human experience of research, planning and writing – cannot understand what it writes". In this sense, Levene's view aligns with Hick's in proposing that AI is discredited as an author because it is an imitator rather than a creator. Certainly, legal precedent has disregarded AI as an author because it does not possess the qualities of author or owner in the human sense (McKendrick 2022). This aligns with the stance taken by the ICJME, who requires accountability and argues that AI tools "cannot be responsible for the accuracy, integrity, and originality of the work, and these responsibilities are required for authorship" (McKendrick 2023).

However, there are those who discredit this assumption, and much of the work in this regard is derived from the theories of Alan Turing. In 1950, Turing posited that a machine is capable of pretending to be human. He argued that if the machine could successfully pretend to be human to a knowledgeable observer, then such technology could certainly be considered intelligent. This test would satisfy most people but not all philosophers because of the nature of the intelligence imitation being enacted by the machine.

In 2012, Raquel Acosta (2012) scrutinised the potential authorship rights debates that may arise from works created by AI within the context of the United States legal system. What Acosta (2012) proposes in her article titled 'Artificial intelligence and authorship rights' has become a commonplace debate among academics and creators alike. She writes:

Advances in AI technologies are making machine authorship a reality, yet the legal standards that govern creative innovation do not take into account non-human innovation [...] Research into AI has led to machine learning techniques and autonomous computing systems where human authorship becomes attenuated or non-existent [...] Yet copyright law excludes works that result from purely mechanised or random processes, so some of the output of computer programs will necessarily straddle the boundary between what is copyrightable and what is not.

Acosta's observation anticipates the current dilemma and anticipates a sense of liminal chaos as boundaries are being dissolved and reconfigured in terms of what authorship is and will be. Humans no longer enjoy autonomy in terms of critical and creative thinking. AI systems are learning these skills as well. It is true that all things that are learnt by humans are initiated through imitation, and that from imitation, humans develop the confidence for critical and creative engagement. Perhaps this is also true for AI, and Turing (1950) was aware of this step in machine evolution as mirroring human evolution. This understanding of the learning capacity of AI opens up the potential for critical and creative collaboration with AI, countering the perceived threat it poses. Jack Stillinger (1991, p. 202)

expressed it eloquently when he commented that postmodern thinking has systematically undone the “romantic notion” of authorship. However, where postmodern and poststructuralist thought empowered the human reader, posthuman thought is now shaping a new relationship between human and nonhuman technology in co-creating. We, therefore, propose that AI technology, applied in design disciplines, should not be regarded as imitators or threats; AI is rather positioned as a mediator in the critical and creative process. It is already mediating our experience of the world and shaping our creative engagement with it.

Critical and creative thinking competencies

When we explore direction in spatial terms, mapmakers, pilots, and navigators use the cardinal values for clear consistent directions. The four main points of the compass – north, south, east, and west – are known as the Cardinal Points. In South Africa, if you are navigating the national roads, such as the N1, taking the offramp for the N1 North or the N1 South will determine whether you arrive ultimately in Cape Town or Mesina. Disruption often has a disorientating effect in that some severe disruptions can shift our sense of location and orientation, much like the effects of an earthquake. Orientation is often unconscious, value-driven, and seldom interrogated. In considering how educators find direction in their theory and practice, we consider both the purposes of higher education and the location of the practice. How educators act and respond to changes will be informed by their experiences, practices, and orientation to what they aspire to achieve as an outcome. Immediate action after disruption is often informed by mental models based on past experience, whether or not those models and the related assumptions are still valid. Such modelling may be disrupted, a little like a compass being affected by a large magnet. And yet, cardinal directions remain in place despite the compass swinging wildly. That being said, we may need to pause and use other reference points or tools to navigate consistently through or past a disruption. We acknowledge that some disruptions may be limited temporally or geographically while others may need to be integrated into an updated GPS of practice.

In order to provide direction or orientation in times, two essential aspects are needed: Where are you trying to go and where you are now. These can be related to higher education in the purpose or outcomes of higher education and the current circumstances of educators. How you travel may be informed or constrained by axiology, budget, or the toolbox available.

Design education and AI

Human-centred learning and the Ubuntu philosophy

In much of the discourse around the emergence of drawing on generative AI, it emerges that there is not really a challenge to cardinal values in education, such as academic integrity, authentic and valid assessment, or student learning. Rather that academics are concerned that AI can be used in ways that undermine these values and the aspirations of causing learning. Therefore, we consider the ways in which AI can collaborate with educators to support student learning, rather than compete with educators or students to displace them from the learning processes.

Furthermore, various algorithms and AI have already been incorporated into tools that are used by authors and students to edit writing or images, to search for information and to process data. Many remain uninformed as to the extent to which they are already drawing on such tools. The release of generative AI has brought the debate of what can be automated or delegated to technology into the mainstream again.

Criteria for authorship in student learning

Design education has long positioned students as content creators and designers during their education process. More than this, students are often required to collaboratively generate content

with others in group work contexts. This can be extended to collaborating with technology such as generative AI or differentiating against using generative AI as a tool, in the same way as software packages like Adobe.

The ICMJE recommends that authorship be based on the following four criteria:

- “Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or reviewing it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved” (ICMJE 2023).

Similarly, authorship requirements can be proposed for students. For the submission of assessments to be considered as authored by a student, that student would need to show a substantial contribution to the creative and critical conception or design of the work to meet assessment prompts. If students can show multiple drafts, editing and critical review of drafts for improvement to meet assessment criteria, this would support evidence of authorship. Submitting (or uploading) a final version to a learning platform can be construed as final approval of a “published version” and taking accountability for the authorship of such a submission. Assessors can require students to disclose whether they used AI or other tools in the production of submitted work and how they used it (similar to ICMJE (2023) recommendations).

Furthermore, existing principles of assessments can be applied when considering the criteria for authorship. Students are required to take accountability for what they submit for assessment against assessment instructions and outcomes. This supports the fourth criterion above.

Therefore, when using AI tools to source content for articles, courseware, or classes, faculty and students must adhere to the existing policy and practice of critically evaluating and verifying the sources of such content, regardless of whether they are original or fabricated by AI. This is analogous to the use of quotations from secondary articles. Allowing or requiring students to disclose the use of, and how they were used, of AI tools would support transparency in assessment.³

According to various assessment policies (for example, SAQA 2014), faculty must evaluate the student's work and abilities based on the assessment as learning, fair, valid, and authentic assessment principles, which measure the student's competence against the required outcomes. Therefore, submitting work done by others or AI as if it were their own violates both ethical and assessment principles. Where assessment instructions specifically preclude the use of AI tools, students who integrate generative AI output and submitted writing as if it was their own, therefore did not meet the relevant assessment requirements. This reiterates that when considering the outcomes being assessed, faculty should align assessments and assessment instructions to clearly delineate what is being assessed and what is being permitted.

Faculty, as discipline experts, remain positioned as SMEs who need to be aware of how AI developments are or may impact their disciplines and research areas and mediate such debates in their respective fields with students. Faculty also remain exemplars of acceptable practice in their respective fields. This would include remaining up-to-date with debates, emerging technology, and applications within their disciplines and in relation to their roles as design educators.

A copyright and Intellectual property concern remains. Authors like Aamir Ali (2023), Greenstreet (2023) or Ozcan, Sekhon, and Ozcan (2023) point out variations in copyright law in various countries and that some of the AI terms of use indicate that copyright may be retained by the company that developed the generative AI used. There are already cases testing these boundaries and cases where

³ Transparency as defined by SAQA (2014).

writers, songwriters and others are asserting their ownership of creative writing that is used without permission by some AI. Not all generative AI disclose or attribute the sources used in answering prompts, and additionally, some of the sources used may be incorrect attributions. For designers and content creators seeking to earn income from such content, these debates are critical to professional practice and thus for design education.

Implications for practice

The challenge for educators is how do we create the curricula, material, and learning activities that interpolate students to actively engage in the processes of learning. Oppenheimer (2023) reminds us that “the best ways of thwarting cheating have never been focused on policing and enforcement; they have been about integrity training, creating a healthy campus culture, and reducing incentives to cheat”. Authors like Mollick and Mollick (2022) have published assessment examples and research on how students can collaborate with AI to complete tasks that require evaluation and reflection. Assessment redesign seems essential to maintaining authentic assessment.

Further critical aspects include emphasising the developmental nature of generative AI, the quality of the materials it draws on (from the internet) and what OpenAI’s CEO describes as “emergent (unanticipated) capabilities” (Brockman 2023). This has resulted in reports of wrong or fabricated information provided in response to prompts. Challenging students to assess responses from AI, similar to discussions relevant to fake news and evaluation of academic sources, can provide opportunities to develop critical thinking competencies.

Faculty remain responsible for clear communication of the appropriate use of AI tools and defining the acceptable use of such tools within the larger discourse of academic integrity. For example, faculty may need to point out that responses of various AI to questions or prompts are not peer-reviewed and cannot be considered an authoritative academic source (much like arguments used about Wikipedia). In addition, given the stated limits of AI by its developers and recent cases of error or fabrication in popular media, faculty can emphasise the need to critically evaluate outputs and the need for contextualisation. Faculty can retain a more defensible position with consistent values by linking these discussions to enduring assessment principles and cardinal values.

Faculty may struggle to recognise the outputs of AI if they are not experimenting with generative AI and participating in their communities of practice. These approaches require ongoing professional development, experimentation, and engagement within communities of practice on how these principles and values are practised in design education.

Conclusion

As can be seen in the discussion above, there is a tension between creation and imitation that is inherent in design education. Design education requires that students become creators. The tension has yet to be resolved, both in the debate as to whether AI will enable greater creation or more imitation, or whether AI will simply imitate the creative. While designers often initiate their learning journey as imitators, a question remains as to whether AI’s trajectory will follow a similar path in truly transitioning from imitator to creator.

The impact of AI disruption may disorientate design educators, yet the cardinal values of teaching and learning remain sure and applicable and enable re-orientation in practice. Part of the disruption of AI is the magnification of existing problems that need to be addressed, such as academic integrity in assessment. The opportunity presented in disruption is to collaborate with technologies to advance and re-align practice to meet the needs of students, facilitate holistic student learning and ease the transition into new ways of teaching and learning.

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SESSION 1: Caring





Vulindlela – making new pathways

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Towards empathetic design for social change: An autoethnographic reflection on teaching and learning practices in a communication design project

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Abstract

Ubuntu philosophy is based on the premise that *umuntu ngumuntu ngabantu* (a person is a person because of other people). Ubuntu emphasises empathy, respect, and sensitivity as core tenets. Ubuntu principles are part of the teaching philosophy of Design for Social Change (DSC) that we use in our visual communication design course at a university of technology in South Africa. This teaching philosophy seeks to find solutions that will not only foster aesthetically pleasing and functional creative outputs from students but will also address the root causes of social problems and empower communities to create change that is enduring and sustainable.

As academics, we co-created a three-month mental health awareness campaign project with students. This process forced us to question how much Ubuntu and DSC philosophies we were really practising in our teaching. In the project, students reflected on their experiences of learning during the COVID-19 pandemic; we listened and began to realise that we were not as socially aware and empathetic to students' COVID-19 and post-COVID-19 pandemic emotional traumas as we initially imagined.

This paper is an autoethnographic examination of the impact of our socio-cultural positions on our teaching practices as visual communication design lecturers. We critically reflect on our experiences during this project and analyse our diverse backgrounds and their impact on our ability to connect with students and student experiences of learning in a COVID-19 pandemic context.

We conclude that visual communication design solutions are powerful tools for social change and promoting design activism but that academic socio-cultural contexts may stand in the way. Design projects promoting social change should also embrace intentional, collaborative teaching. Lecturers should consider projects that disrupt their own personal bias as this has an impact on their ability to connect with students and their experiences of learning.

Keywords: Collaboration, communication design, social change, teaching and learning.

Introduction

Design is a powerful tool that can guide and influence society (Herland 2021). Within the field of communication design, both academics and designers have a responsibility to be sensitive to socio-economic issues and empathetic design in order to foster communication that will impact society (Tu, Zhang & Zhang 2021). The teaching philosophy known as Design for Social Change (DSC) advocates a better world for all humanity, and highlights the critical role design and marketing educators play by becoming and developing social change agents. The role of educators as agents of social change is

affirmed by authors such as Shea (2012) and Souleles, Ferreira and Savva (2019), who highlight the role educators play in contributing to the development of future-ready students.

The South African Council on Higher Education (CHE) report emphasises the importance of good teaching in creating conscious students, fostering learner-centred dialogue and reflecting on social context (Leibowitz et al. 2017). DSC is a transdisciplinary field that focuses on social issues and aims to achieve collective goals rather than consumerist objectives (Souleles 2017). South African design educators should contribute more extensive literature on teaching practices to cultivate students' sensitivity towards social issues, thus promoting an awareness of values and beliefs on topics that factor in the complexity of intersections between ecosystems, such as the cultural, social, political, economic and technological context (Savva, Souleles & Ferreira 2019; Costandius & Botes 2018; Butera et al. 2020).

This paper aims to contribute to this broader conversation by exploring individual and collective experiences, challenges, and insights obtained through the three months of a class project for a communication design course focused on mental health. The reflection process is encouraged by researchers such as Gorski and Dalton (2019) who argue that it is essential for lecturers to constantly evaluate and reflect on their teaching and learning approach as applied in the classroom and in projects. Reflection on past projects is important because it helps to chart a different path for future projects. This paper will, therefore, follow a reflective autoethnographic methodology to assess how far Ubuntu principles and other pedagogy were used during our mental health project with students.

Methodology

This paper deploys an autoethnographic reflection of teaching practices by design and marketing lecturers in a mental health design project focusing on social awareness and change. In concrete terms, the authors explore their individual and collective experiences, challenges, and insights in the project. A qualitative autoethnographic approach was selected because it focuses on the creative analytic practice of reflecting and writing (Done et al. 2011). Autoethnographic writing is an introspective and self-reflective process that engages in reflection and reflexive thinking (Roy & Uekusa 2020). We examine our personalities, preconceptions and biases and how these affect and shape our subjectivity regarding cultural and social dimensions that impact intercultural communication (Gorski & Dalton 2019).

We selected a creative analytical practice (CAP), informed by Boluk, Muldoon and Johnson (2019) who argue that this form of writing shifts from the traditional writing style and explores alternative writing forms in storytelling (Done et al. 2011). This approach is multifaceted and complex and is influenced by contextual observations through creative means (Berbary 2010; Boluk, Muldoon & Johnson 2019). Techniques used in creative analytic research include sharing experiences through storytelling and figurative descriptions. By applying this method, we aim to connect with the reader and provide a deeper understanding of our analysis (Boluk, Muldoon & Johnson 2019). The autoethnographic narrative provides a holistic and interpretive understanding of the processes and experiences of the mental health project under discussion. The paper further explores and unpacks our lived experiences and the cultural nuances we encountered during the project.

Design for social change

The concept of DSC encompasses a broad range of activities that focus on social issues and aim to achieve collective and social goals, rather than consumerist objectives (Souleles 2017). Souleles, Ferreira, and Savva (2019) also suggest that there are other closely related terms, which are relevant, including public-interest design, social impact design, design for social advocacy, socially responsive design, transformation design, human-centred design, social entrepreneurship and design activism.

Design and the design thinking process have the potential to change lives and the power to challenge and solve problems creatively. For example, collaboration with organisations such as IDEO Design Thinking and the ArtCenter College of Design are examples of how design creates meaningful change (ArtCenter College of Design 2023). The ArtCenter College of Design has been in partnership with the non-profit organisation (NGO) Designmatters since 2002. The partners realised the importance of creating social change through collaborative transdisciplinary design thinking solutions that focus on social justice, sustainable development, public policies, health, and social entrepreneurship (ArtCenter College of Design 2023).

Academics for social change

Lecturers should promote change at a societal level in order for them to become agents of social change (Butera et al. 2020). This also embraces the complexity of creating future-ready graduates who will tackle jobs and solve social problems that have not been predicted (OECD 2018). To be a future-ready design graduate means being equipped to face technological disruption from the Fourth Industrial Revolution (4IR), artificial intelligence (AI), and the metaverse that opens a 3D virtual world (Chloe 2022). Even though such technological developments are ongoing and have the power to change lives, Behari-Leak (2020) also reminds us that we live in an unequal world and that social disparities such as poverty and unequal access to education create a gap, which means that some members of society are always playing catch-up. Future-ready design graduates are therefore tasked with being able to responsibly use technology and design thinking for a more socially just world (Behari-Leak 2020).

To impart future-ready skills to students, lecturers are expected to evolve in line with changes, which require continuous academic development. Vocational teacher training programmes can assist academics to keep abreast of teaching and learning techniques, which in turn can improve the student experience. Many researchers recommend such programmes as valuable catalysts for assisting lecturers to become change agents who play a critical role in driving transformative and social change (Bourn 2016; Novelli & Sayed 2016; Purcell, Henriksen & Spengler 2019).

Becoming a social change agent is a personal developmental journey. Alvin Toffler, writing in the 1970s, already predicted the impact of rapid technological change on the widening gap between those with resources and those without, and he emphasised that people who cannot adapt, those who are not willing to relearn, unlearn and learn, will be left behind (Toffler 1970). The notion of relearning and unlearning resonates with how we define the importance of constantly going through a self-reflective and reflexive process for personal and professional growth.

Reflection

The idea of reflection was introduced by philosopher and educator John Dewey, who published *How we think* in 1933, but over the years, reflection has been modelled in various ways. Hoa and Tuán (2019) address the process of stimulating student reflection, and discuss two main dimensions of reflection models: the iterative dimension and the vertical dimension. The iterative dimension, drawn from authors like Schon and Boud, emphasises knowledge in action, experimentation, and reflection (Hoa & Tuán 2019; Herland 2021). Boud's model involves returning to experiences, paying attention to feelings and re-evaluating outcomes. The vertical dimension involves different levels of analysis and synthesis, and requires more critical thinking (Hoa & Tuán 2019). Dewey's original model emphasises thinking, which in turn influenced Freire's critical pedagogy and Mezirow's transformative learning model (Rennick 2015).

Hoa and Tuán (2019) evaluate various models and highlight how Mezirow's model divides reflection into habitual action, deliberate action/understanding, reflection and critical reflection. Hatton and Smith's model, however, divides reflection into description, descriptive reflection, dialogical reflection, and critical reflection to create new knowledge in action (Hoa & Tuán 2019). By contrast,

Moon's model divides reflection into noticing, making meaning, creating meaning, working with meaning and transformative learning (Tur, Marín & Challinor 2017; Hoa & Tuấn 2019).

Lecturers can strategically design and facilitate transformative learning in the classroom by utilising teaching and learning practices, such as experiential learning (Costandius 2012; Lawson 2017), critical pedagogy from scholars such as Paulo Freire and Henry Giroux (Giroux 2010) and problem-based learning by Howard Barrows (Tawfik 2015). These pedagogies can assist in framing students' inclusive self-reflective outlook.

Reflexivity

The above-mentioned pedagogies and the process of self-reflection inform personal transformation (Mezirow 1997). Critical self-reflection and reflexivity are able to assess preconceived assumptions of one's inherited habits, which have been accumulated, acculturated, and perpetuated through our beliefs, socio-cultural, economic, political, and educational systems (Mezirow 1997; Wilson 2014; Herland 2021). Critical thinking forms a key part of reflexivity, and so reflexivity as a skill for researchers and lecturers involves developing techniques to question their attitudes in an outward-looking manner while examining the ramifications of what they have discovered through the larger context of their research or within the classroom setting (Wilson, Janes & Williams 2022).

The definition of self-reflexivity is the ability to reflect on individual experience as it occurs (McDougle & Alexander 2023). However, this must not neglect the emotive experiences that can be generated throughout the self-reflective and reflexive process (Herland 2021). This requires becoming self-aware of one's own biases and assumptions, which can be uncomfortable and may evoke emotional responses at a meta-level (Nagata 2004; Wilson 2014). The act of engaging in a process of self-reflection and self-reflexivity is important for personal growth, learning, and development. It involves taking a critical and honest look at one's own thoughts, feelings and actions, and considering how these contribute to our understanding of the world around us.

As a tool, self-reflective and reflexivity processes can contribute to transformative learning by communicating with others; in this case, the communication was with students and between colleagues. This process allows us to gain insights into our own beliefs and biases (Wilson 2014), and to identify areas where we may need to make changes in order to improve ourselves and our relationships with others.

Ubuntu

Recognising the interconnectedness of humans with the goal of forming a better world for all starts with understanding one's shortcomings and strengths (self-reflection) and being reflexive, thus gaining an awareness of one's preconceived assumptions and biases. The proverb *umuntu ngumuntu ngabantu* (Nguni) translates as 'a person is a person because of other people', and sums up the philosophy of Ubuntu. It reflects the need to express compassionate humanity to others so that they reciprocate (Higgs et al. 2000). Ubuntu thus creates a community that navigates relationships on the base of mutual understanding and respect.

Ubuntu is also defined as an act of *becoming* in relationships of empathy in order to better serve and reach common goals and promote social cohesion (Dowdeswell & Hoobler 2022; Waghid 2020). The humility in treating others with dignity (*seriti* in Setswana) and respect does not take anything away from who you are; in fact, it edifies one's humanity as we were not meant to live in silos (Waghid 2020; Le Grange 2021).

The idea of cultivating empathy through Ubuntu in our design classroom environment is relevant to the creation of social change agents who have the ability to place themselves in others' shoes. It entails an attitude of promoting diversity of thoughts, which includes embracing indigenous knowledge systems and practices and exploring ethical, collaborative projects that have the power to address and solve social, economic, health, environmental and sustainability issues for all.

Teaching pedagogies

Who are we

We are lecturers at Tshwane University of Technology (TUT) in the Department of Visual Communication. We specialise in the fields of graphic design [Tsholofelo (Mothusi) Matome] and marketing [Tumishang Sekhu]. As academics, we understand the role we play in fulfilling the mandate of TUT's mission of contributing to social and economic transformation through curricula engagement and learning experiences. Most of the students in our classrooms are Black and come from cities, townships, and villages across southern Africa. As a result, we are cognizant of how these differences impact student learning and we strive to create an inclusive and supportive learning environment. Our teaching philosophy embraces transformative learning, which involves making a personal choice based on acquiring knowledge and experiencing a particular phenomenon that also involves emotions (Hoa & Tuán 2019). We believe that a student-centred approach is beneficial in design education because it allows students to engage, collaborate and take ownership of their learning experiences (Butera et al. 2020). Our teaching philosophy is rooted in social constructivism, with a focus on promoting social change through integrated design and marketing strategies that address socio-economic issues. We strive to create a student-centred environment that values cultural diversity and fosters critical thinking. We also believe that learning should be an active and collaborative process with meaningful transformations both inside and outside the classroom (Kim 2001; Kim, Raza & Seidman 2019).

Lecturer 1 [Tumishang Sekhu]: *In the Graphic Design (NATED) phased-out course, my marketing module enables the design students to understand specific target audiences in order to design communication that is effective. In addition, marketing strategies are taught that challenge design students to push beyond their technical expertise to develop a broader understanding of social issues affecting consumer behaviour. My approach in class is to challenge students to research and debate economic, cultural, and ethical issues that affect marketing strategies and communication practices. The aim is to critically analyse and challenge the societal and cultural norms within which marketing communication operates. Such topics are introduced and implemented in class discussions, individual and collaborative projects, presentations, and feedback sessions.*

Lecturer 2 [Tsholofelo (Mothusi) Matome]: *As a graphic design lecturer who specialised in illustration and drawing modules for the Graphic Design (NATED) phased-out course, my task was to facilitate in students the creation of conceptually strong visuals that communicate through appropriate well-researched visuals aligned with the criteria or outcome of the brief. My task is not to create a one-size-fits-all approach but to structure an iterative creative process for students that lends itself to developing their own unique design style and way of thinking by using a student-centred constructivist approach. However, I also advocate for students to become critical designers who should not undervalue the power of design as a change agent. In addition, I also prefer that students first look for relevant inspiration within Southern Africa and Africa.*

Classroom discussion topics are selected not only for the achievement of aesthetic excellence but also to critically stimulate students' outlooks on various issues. I think students should be exposed to diverse perspectives, and education should challenge students to consider other realities outside those informed by their immediate backgrounds.

Lecturers 1 and 2: *We engage in constant brainstorming and debate sessions; our friendly debates often highlight how different our individual worldviews are and sometimes surprise us! When differences come up, this often leads to further discussion that may include the viewpoints of other colleagues and students. We both find it interesting how student opinions become even more expressive when articulated or expressed in their mother tongue or Kasi lingo (local slang). Although these opinions can range from funny to shocking, we allow mother tongue and Kasi lingo expression in our classes as it enriches our understanding of our students' thoughts, opinions and experiences,*

especially those thoughts expressed when they think we are not listening and are just talking to their peers.

By co-facilitating some of our projects, we have gained fresh appreciation for a culture of dialogue with students. Unfiltered student discussions assist in picking up certain key points that could potentially be formally integrated into classroom settings. For instance, marketing topics such as socially conscious consumer behaviours and ethics (Prendergast & Tsang 2019) can incorporate relevant socio-economic issues that provide better context and a better understanding of the topic at hand, thus playing a crucial role in nurturing students' awareness of societal issues (Boulocher-Passet, Farache & Popma 2017).

If we neglect to incorporate these dimensions into our marketing and design teaching and learning processes, we would be inadequately preparing our students (Boulocher-Passet, Farache & Popma 2017). This is one of the reasons why we intentionally try to stimulate students to reflect on their roles as South African citizens and critical thinkers, who hopefully will come to understand their role as critical designers and future leaders.

Our mental health project experience

Summary of the project

Title: Mental health awareness month campaign

Third-year Graphic Design (NATED) combined project: Marketing and Design Technique (photography, illustration, and drawing)

Summary of brief: The South African government has commissioned you to create a full-blown campaign for mental health awareness month that uplifts and encourages one to overcome mental issues.

Overall outcome: You are required to create an integrated communication campaign that creatively interconnects marketing strategies and design techniques and tools to professionally communicate the campaign.

Group work: At least five to six members in a group

Duration of project: Three months

Personal experiences of the project

Lecture 1: *This journey with the mental health project was deeply transformative for me. I had recently been in close contact with family members struggling with mental health challenges, which heightened my sensitivity towards students facing similar issues.*

I felt compelled to create a safe space for my students to confide in me and share their concerns and troubles. However, as an educator, I soon realised the limitations of my role when it came to counselling and therapy. I had to be mindful of the professional boundaries that restricted my direct involvement in students' personal lives. My primary offering was compassion and empathy, coupled with a strong recommendation that any students facing significant challenges seek assistance from trained professionals, such as the Student Support Services (SDS) provided by the university. As an educator, I have come to acknowledge the diverse challenges that our students face and the profound impact that the projects we choose can have on their lives. I believe that recognising and addressing these challenges with compassion is pivotal in creating a learning environment that supports students' mental health.

This project hit very close to home for me. Some of the conversations we had with students left me feeling deeply triggered, but I learned to separate my personal issues from my role in supporting our

students. This project created an invaluable space for students to not only reflect on their personal lives but also use their design talent to have a greater impact.

Lecture 2: *Growing up, my limited knowledge of mental health was that people get admitted to hospital and are given pills that make them sleepy. Such narrow perceptions of mental health were compounded by cultural stigma and ignorance. Due to the nature of my work, I have come to learn about and understand the far broader spectrum of issues that constitute mental health. Throughout the project, one-on-one discussion with group members revealed personal issues that students (voluntarily) shared with me. Conversations ranged from students admitting to being heavily medicated on anxiety and depression pills from a young age to some becoming reclusive and admitting to carrying their family problems on their shoulders. For me, this project highlighted not only how resilient students can be, but also how parents sometimes overshare their personal problems with their children. In addition, the COVID-19 pandemic made me very sensitive and empathetic to students' mental states (Klusmann et al. 2023.) As a consequence, I have learned to take note of student behaviour and facial expressions in and outside of class.*

I had to also reflect on my mental well-being and we reminded each other as colleagues that it's important to accept limitations; we can only guide a student to a certain limit.

Lectures 1 and 2: *As agents of change, we actively engage in continuous constructive criticism to foster an environment that encourages unlearning, relearning, and ongoing learning (Toffler 1970). Moreover, we strive to evolve as 21st-century lecturers capable of navigating blended learning environments (Kim, Raza & Seidman 2019; Khahro & Javed 2022) and we address the topic of socio-economic disparities in our pedagogy.*

An article on the role of educators in a changing world (News24 2018) reminded us that "being an educator in South Africa requires you to become a police officer, nurse, social worker or a lawyer, etc. all rolled into one". Unfortunately, by playing these roles we end up carrying students' emotional burdens on our shoulders. The use of the word 'unfortunately' in this context highlights how our motherly roles (BoMma) can to some extent create empathetic affiliations with students, which result in us unconsciously carrying student problems with us outside of the academic space. This became especially apparent during the COVID-19 pandemic when we were confronted by socio-economic, physical and mental health issues that negatively impacted our work. To address these challenges, we found we had to set boundaries and adjust the power dynamic between ourselves and students. We reduced the direct interpersonal dimension and instead aimed to connect students to institutional support systems, such as campus health and academic services. By removing the emotional mother-child role, we found we were able to focus on building richer relationships based on Ubuntu and empathy, rather than implicit familial roles.

Our colleagues also reminded us of methods to reduce direct interpersonal involvement and place boundaries that are necessary to reduce academic and personal burnout (Fynn & Van der Walt 2023). Through this process, our mutual respect and interconnectedness with our colleagues grew; we came to understand that their humanity was connected to ours and that our mental well-being and the mental load of the teaching work were also their concerns. This is a key principle of Ubuntu, and shows Ubuntu in play.

Observations – before, during and after the project

In early 2021, we observed a concerning decline in student attendance. This was partly due to "coviding" (COVID-19-pandemic-related disruptions). We also encountered a more profound issue that surfaced when we began engaging on the mental health topic. Students struggled to address sensitive topics with tact, and negative stereotypical perceptions of mental health had taken root in the student community. For instance, some students believed that mental health issues were a "White people" problem or associated with *boloyi* (witchcraft). Although this particular course has been

discontinued, we realise for similar future project that sensitive issues or topics must be tackled in advance with students for better outcomes.

As the project progressed, we created safe spaces within our educational environment where students could address and break down stereotypes and engage in respectful and sensitive class and group discussions. There was a progressive shift in group dynamics, marked by increased respect and empathy through tolerance and better understanding. The use of mother tongue or Kasi Lingo in the project helped students to achieve a better understanding and create messages that were relatable to target audiences.

By the end of our project, we saw many positive outcomes: a significant improvement in class attendance, a remarkable level of openness among our students and a newfound ability to tackle sensitive issues. Most importantly, our students gained a deep appreciation of their role and responsibility as designers. We realised it would have been useful to bring in SDS to speak to the students before the project commenced.

We feel that the broad DSC approach we adopted helped significantly to foster a culture of lifelong learning where students are no longer just learning about design, but also gain insight into broader complexities of the human experience and their role in shaping a more compassionate and empathetic world. This underscores the value of the DSC approach allied with the philosophy of Ubuntu.

Key findings

Self-awareness as an Ubuntu principle

Self-awareness is a reflective and reflexive process that shapes one's thoughts, emotions, and behaviour (Herland 2021). Within a collaborative context, we all need to be careful about devaluing the opinions of others (Loh & Ang 2020). That is why we prioritise listening to understand and questioning for clarity. In addition, we realise the importance of being sensitive to how we articulate (verbally and physically) our opinions to students.

During the project, we realised that some students were proactive in becoming the glue that connects their group, thus bringing harmony and social cohesion, while others needed some support to reach this point. In addition, we found that preconceived ideas and biases could often be challenged in a group setting. In this context, there thus comes a time when students need to acknowledge their mistakes and humbly eat their pie, which takes a great deal of humility and self-awareness to accept shortcomings.

Diversity among students and lecturers

In critically examining our own experiences and cultural backgrounds, we realised that our personal circumstances might place us at a disadvantage in relating to students' everyday realities and perceptions. By taking the time to understand the cultural dynamics of our students, we cultivated a better appreciation of their diversity of outlooks. This also created a more tolerant environment for both students and colleagues, and it opened lines of communication that we found assisted us when navigating issues within team dynamics. Diversity plays an important role in group work, but we also found that certain students were letting down their teammates, so it became necessary to engage with them directly regarding their mental state and the impact it was having on their group.

Navigating diversity through Ubuntu

We found it very valuable to constantly remind students how their cooperation in completing group work is a symbiotic relationship that fosters life skills and lifelong relationships. In the group context, we found students were also able to share with each other about their personal challenges. This resulted in more empathetic interactions within the groups. Once again, this echoes the phrase:

umuntu ngumuntu ngabantu. For us, the philosophy of Ubuntu extends beyond the straightforward notion of humanity. It is an entire ethos and value system that has been culturally fostered through our heritage, and at times it even feels like an ethereal knowing of being and belonging to self and to others (Van Breda 2019).

Team support

Students who would normally be passive team players stepped forward and showed leadership skills at a time when some group members were not adjusting well to the transition of returning to campus and class on a full-time basis. During our discussions and presentations, we observed that receiving affirmation from their peers had a significant positive impact on student confidence in public speaking.

At present, we only provide students at first-year level with an introductory presentation on the functions of SDS. Given the high levels of stress we encountered in students at third-year level, we recommend that SDS should be re-introduced at the start of each year in future. This could include workshop sessions for students and lecturers focused on wellness and mental health.

As educators, we created a support group for staff that allowed us to support each other in times of difficulty. Some of our colleagues struggled with ill health while some had lost family members. The support given within the groups established a sense of togetherness that boosted the team's morality.

Conclusion

The process of exploring a mental health project and our experiences as educators have highlighted the importance of empathy, dialogue and continuous reflection in teaching and learning. We realise we have embraced blended learning environments and we are now able to acknowledge and understand the multiple roles we play as teachers in South Africa. As a consequence of this reflection process, we now strive to strike a better balance between supporting student development and maintaining professional boundaries.

The self-evaluation process confirms to us that educators play a crucial role in social change (Bourn 2016) and we realise we will benefit in future from a component of ongoing and integrated reflection to develop effective strategies for the design education we offer students. Reflecting on our positive experience of working together and blending our two subject fields leads us to advocate transformative learning collaborations in a variety of vocational fields. This requires the development of co-teaching practices and transdisciplinary collaborative projects that are tailored to the social needs of South African students.

Furthermore, through our self-assessment we have recognised the significance of Ubuntu philosophy in design education, with an emphasis on human interdependence and interconnectedness. Examples of using Ubuntu philosophy in our practice include facilitating constructive debates in a collaborative environment. Our introspection showed that by embodying the Ubuntu principle, educators can naturally develop self-awareness and care for others; this in turn fostered our awareness of socio-economic, political and cultural issues, including respect for indigenous languages and practices.

In conclusion, our journey as educators and researchers has highlighted the importance of empathetic DSC that facilitates continuous professional development through reflexive and reflective processes. Unfortunately, the phasing out of the Graphic Design programme has meant that we could not fully implement lessons learnt in that programme, but our analysis of and reflection on this student project has served as a valuable lesson in the ongoing importance of acknowledging students' effort and motivating them to function as a cohesive group. Our self-evaluation has also made us appreciate our own need for training in how we approach issues such as mental health, for the benefit of our students and our own mental well-being, so as to make a positive difference in the lives of our students. We acknowledge that DSC requires personal commitment and hard work to create spaces for fostering constructive, disruptive, and respectful dialogue, even within the hidden curriculum of universities.

Our experience leads us to affirm our commitment to DSC as a way to strive towards and contribute to reimagining the future of design higher education in South Africa.

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Exploring the need for fashion drawing skills training amongst unqualified fashion entrepreneurs in the Emfuleni local municipality

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Abstract

Fashion entrepreneurs contribute greatly to the local and South African economy. It is, therefore, vital to equip fashion entrepreneurs with necessary knowledge and skills, to ensure the success of their entrepreneurship. Fashion entrepreneurship demands occupation-specific skills. Without these skills, client satisfaction levels can decrease, influencing the success of the entrepreneurship. This article aims to describe the need existing amongst peri-urban fashion entrepreneurs without formal fashion-related training, with regard to the possession and utilisation of fashion drawing skills. A quantitative approach by means of interviewer-administered questionnaires was employed to explore this need. Non-probability sampling was used to identify 114 respondents. The study concluded that a need exists among fashion entrepreneurs with no formal fashion-related training, to acquire fashion drawing skills through training. Through the provision of the necessary skills, these entrepreneurs will be equipped and empowered, as it increases their vocational skills, and might have a positive impact on the success of their entrepreneurship. The study recommends that future training initiatives, either by government or educational institutions, offer training to fashion entrepreneurs without formal fashion-related training with specific reference to fashion drawing skills.

Keywords: Entrepreneur, fashion drawing, fashion entrepreneur, fashion entrepreneur challenges, visual communication

Introduction

The fashion industry is ever-expanding globally (López-Navarro & Lozano-Gómez 2014, p. 2) and plays a major role in the socio-economic development of countries (Sarpong, Howard & Osei-Ntiri 2011, p. 98). Asian countries, for example China and Vietnam, among others, have been known to thrive in the international textile and fashion trade, due to their successful training programmes in apparel design (Maiyo, Abong'o & Tuigon'g 2014, p. 63). The fashion industry in South Africa (SA) is also important as it forms part of economic development programmes (Dlodlo 2014, p. 191), aids in income generation for individuals within major cities, peri-urban areas, and small towns, and contributes to about one-third of GDP (Brandstories 2023). Therefore, successful training programmes, regarding fashion-related skills, have a pertinent link to a successful fashion industry and a direct impact on the income generation of individuals and communities.

Nonetheless, not all individuals within the fashion industry have acquired formal fashion training. Some individuals may have obtained fashion-related skills (such as sewing, pattern making, and fashion drawing) through family members, secondary school, short courses, or in-service work experience. These skills, particularly fashion drawing and illustration (hereafter referred to as fashion drawing), are necessary visual communication skills with which designers relay their ideas and designs to clients, through the use of sketches, photographs, drawings, among others. Visual communication is a pictorial form of communication where visual symbols are used to convey information (Liu 2015, p. 41).

Literature review

Following is an overview of the needs of skills training among Fashion entrepreneurs.

Role of entrepreneurs in the global and national economy

Globally and nationally, entrepreneurs are pillars of economic growth and development (Stoica, Roman & Rusu 2020, p. 18), as well as unemployment alleviation (Hui 2019, p. 593). The main type of entrepreneurship in SA, operated by individuals residing in less privileged or impoverished communities, are categorised under micro entrepreneurships (MEs) (Fatoki 2014, p. 157). MEs alleviate unemployment and poverty (Leboea 2017, p. 14), due to the important role, which they play in rural and urban communities (Rao, Venkatachalm & Joshi 2013, p. 136).

Entrepreneurship, the most common form of employment within impoverished communities, are generally started within industries with low start-up costs (SEDA 2016, p. 32), such as the clothing and textiles (fashion) industry (EDGE 2014, p. 24). Fashion-related entrepreneurs are five times more likely to start their own fashion business than those in other professions, mostly due to the low start-up costs required for necessary equipment (Burke 2010, p. 12). In general, entrepreneurial endeavours are relatively short-lived (Liang, Wang & Lazear 2014, p. 21), and have failure rates as high as 75% in SA (Fatoki & Asah 2011, p. 170). This failure rate is also relevant to fashion entrepreneurs (Kurz 2010, p. 14) facing general and field-specific challenges (Choto, Tengeh & Iwu 2014, p. 93; du Plessis & Marnewick 2017, p. 2). General challenges experienced by South African entrepreneurs were identified as the lack of formal and informal education (State of Entrepreneurship in South Africa 2009, p. 7), which is related to entrepreneurial success (Choto et al. 2014, p. 95). Education is acknowledged as key to successful entrepreneurships (Arthur, Hisrich & Cabrera 2012, p. 501) and relates to the concept of knowledge and skills (Green 2009, p. 1; Rao et al. 2013, p. 139).

Fashion entrepreneurs need relatively large skill sets to manufacture fashion products and sustain businesses (Burke 2010, p. 13; Kurz 2010, pp. 22). With relation to this study, fashion entrepreneurs must possess skills and techniques to present ideas and designs to clients (Burke 2006, p. 12).

Importance of skills training in fashion entrepreneurships

Training and development is critical for businesses to increase effectiveness, productivity and profitability (Nwaeke & Onyebuchi 2017, pp. 153) leading to an increase in competitive advantage (Sheehan 2014, p. 13). The concept of *training and development* is seen as an educational process where individuals acquire new knowledge or reinforce existing knowledge, to aid in improving their effectiveness and general competence (Sandamali, Dinithi Padmasiri, Mahalekamga & Mendis 2018, p. 13), through the identification and implementation of specific training and development strategies (Kutzhanova, Lyons & Lichtenstein 2009, p. 194). Entrepreneurs should possess both general entrepreneurial and sector-specific skills, contributing to more successful businesses (Rao et al. 2013, p. 145).

Fashion entrepreneurship is a specialised field (Rao & Joshi 2010, p. 100) and requires business-related and fashion-related skills. For fashion entrepreneurs to obtain and continuously develop their skills, they are advised to attend training opportunities offered at Universities of Technology, SETA training centres, colleges, or art schools to obtain qualifications within this field (Shah & Mehta 2009, p. 6). Such training can equip fashion entrepreneurs with the required theoretical and practical skills needed to succeed in their Fashion businesses (Shah & Mehta 2009, p. 6) and enhance their natural talent (Van Wyk 2007, p. 94), which is the key to the development of individuals (Sarpong, Howard & Amankwah 2012, p. 473).

Theoretical knowledge in fashion includes, amongst others, creative design, drawing, illustration, technical drawing, fashion theory as well as textiles (STADIO 2020, p. 4). Fashion-related practical skills can be derived from the theoretical knowledge, including practical visual communication skills needed to complete the process of concept (designing) to consumer (constructing finished product) (Tselepis & Mastamet-Mason 2013, p. 260).

Fashion entails visual products, the communication of products' designs by way of visual communication (Ryder 2005, p. 6). For this paper, visual communication is seen as the process of formulating a fashion sketch by a designer, and the interpretation of the sketch by a client.

Problem statement

Research by Van Wyk (2007, p. 78) in the Emfuleni Local Municipality (ELM) concluded that the most prominent skill that fashion entrepreneurs needed, but did not possess, was that of fashion drawing. These drawing skills are necessary for entrepreneurs to possess, as they form the basis of the visual communication process used to communicate designs to clients. The lack of drawing skills could be problematic, as it relates to client satisfaction, which, in turn, promotes the success of entrepreneurial endeavours (Burns & Bryant 2002, p. 42).

This paper explored and described the needs for fashion drawing skills training amongst fashion entrepreneurs with no formal fashion-related training, situated within the ELM. The specific objectives for this research were to explore and describe the:

- Use of fashion sketches to visually communicate the idea/design of the garment to the client
- Challenges experienced by the fashion entrepreneurs when communicating an idea or design to a client
- need for training of fashion sketches as means of visual communication.

Methods

Research design

An exploratory, descriptive, cross-sectional quantitative research design was followed to explore the need for fashion drawing skills training among fashion entrepreneurs.

Research setting

Sampling

Purposive sampling was used to collect data from 105 Black African fashion entrepreneurs within ELM, with operational businesses for more than two years, and with no formal fashion qualifications. Recruitment took place in five fashion material retailers, in ELM, with permission from the owners. ELM is located in the southern part of the Gauteng province, SA. ELM's population make up 81% of the Sedibeng District

Municipality (SDM) population (Sedibeng 2020, p. 10), hence the focus on Black African fashion entrepreneurs.

Data collection

Data were collected by means of interviewer-administered questionnaires through four trained fieldworkers from the local community. Considering possible language barriers of respondents allowed fieldworkers to clarify questions and instructions on the questionnaire without providing any answers to questions (Babbie & Mouton 2003, p. 250; Martins 2005, p. 147). Guidelines for training of fieldworkers by Babbie (2013, p. 282-285) were considered during the training. Ethical clearance for this study was obtained (ECN10-2016).

Development of questionnaire

The constructs of the questionnaire were developed by consulting various sources (Table 1). The aim of the questionnaire was to gain an insight into respondents' current use as well as the intensity of the use of fashion sketches, the intensity of challenges experienced with specific aspects of fashion drawing, as well as establishing the respondents' perceived importance of training in fashion drawing as visual explanation method and its ability to increase client satisfaction.

Table 1 illustrates the various components, Likert scales used and literature sources of the questionnaire.

Table 1: Questionnaire development

Section	Included questions relating to...	Scale used	Literature source
A	demographic information	N/A	Van Wyk (2007)
C	the use of fashion sketches as a method of visual communication.	Often = 3; Sometimes = 2; Never = 1	Kim and Cho (2000); Wibowo, Sakamoto, Mitani and Igarashi (2012); Calderin (2013)
D	various aspects of fashion drawing that respondents might have difficulty with when communicating their designs to clients.	Very much =3; A little = 2; Not at all = 1	Kim and Cho (2000)
E	fashion drawing training needs of the respondents.	Very important = 3; Important = 2; Not important = 1	Kincade and Gibson (2010); Kurz (2010); Calderin (2013)

Data analysis

Data were analysed applying SPSS, and descriptive and inferential statistics were performed, including ANOVA, T-tests, correlations, and cross-tabulation. For this paper, Spearman's correlation coefficients with a medium effect ($r = 0.30$ to 0.49) or a large effect ($r = 0.50$ to 1.0) (Pallant 2010, p. 134) were reported. In this study, p -values ≤ 0.05 indicated practically significant correlations and differences (Pallant 2010, p. 135).

To determine construct validity, exploratory factor analysis was applied, and factor loadings ≥ 0.4 were considered, due to the specific sample size (Field 2009, pp. 644, 645). Keiser-Meyer-Olkin (KMO) indicated sampling adequacy with values ≥ 0.50 (Sarstedt & Mooi 2014, pp. 242, 243). Ensuring the reliability of this study, the internal consistency was measured by incorporating Cronbach's Alpha

coefficient (Pallant 2010, p. 6). Only questions and factors displaying a value of ≥ 0.6 were considered acceptable (Sarstedt & Mooi 2014, p. 256).

Results and discussion

Demographics

Most fashion entrepreneurs were married (52.9%); females (84.5%); operating a business for more than five years (73.8%); were between the ages of 18 to 65 years; and only 44.2% had an education level equivalent to Grade 12.

Current use of visual communication methods

The current method used by most respondents (82.7%) to present designs to clients, favoured using *commercially available fashion images*¹ (mean = 2.62; \pm SD 0.60; $\alpha = 0.82$). This includes cell phones or tablets (mean = 2.74; \pm SD = 0.61) linked to the use of photographs (mean = 2.66; \pm SD = 0.68) and internet applications, such as Pinterest and Instagram (mean = 2.53; \pm SD = 0.81). These results agree with Liu and Liu (2017, pp. 409, 410), who stated that the use of traditional media methods (hand sketching and painting) are waning, due to the rapid development of electronic communication technology and the expansion of digital culture.

The use of fashion sketches ranked the lowest (mean = 1.99; \pm SD = 0.81), indicating that most fashion entrepreneurs do not sketch a design themselves, because they might not have the ability or skill to do so. Commercially available fashion images were a more convenient method (Liu & Liu 2017, p. 410) to communicate intended designs to clients. These results are concerning, as drawing designs is not only seen as the core of a designer's work (Bhatia & Juneja 2016, p. 87), but also as a very important skill that home-based fashion entrepreneurs should possess, to communicate designs to clients visually (Sinha 2002, p. 8). Table 2 depicts the individual items of *commercially available fashion images* used by respondents to visually communicate designs to a client.

Table 2: Summary of exploratory factor analysis of the seven-item use of visual communication methods questionnaire (N=105)

Item	Factor loading
	Commercially available fashion images
Photographs	0.86
Internet, e.g., Pinterest, Instagram	0.85
Photos from magazines	0.81
Cell phone/tablet	0.75
Commercial patterns, e.g., Vogue, Butterick, McCall's	0.47
Total variance explained by extracted sub-factors (%)	49.01
Range of communalities	0.26-0.91
KMO	0.74

¹ Images or photographs sourced from magazines or internet application (such as Pinterest and Instagram) which are displayed on an electronic device such as cell phones or tablet. These sketches exclude hand drawn sketches.

Cronbach alpha coefficient	0.82
Mean ±Standard deviation (SD)	2.62 ±0.60

*Factor loadings indicated in shaded grey areas have been grouped together

**Often = 3; Sometimes = 2; Never = 1

Client understanding of design

Respondents were provided with visual examples of two formats of drawings, namely technical drawing and fashion drawing, to ensure that they understood the differences between these two formats. Fashion drawings were preferred by 57.9% of the respondents, while 42.1% believed using technical drawings would aid more in this regard. These results indicate that respondents believe that some form of fashion drawing is important, to ensure a client has clarity about the intended design. This result is confirmed by Coburn and Schenk (2017, p. 4).

Difficulties with fashion drawing skills

Results in Table 3 indicated that between 36.2% and 41.3% of respondents find it very difficult to illustrate mentioned aspects. The most difficult being displaying the way different types of textiles, influence the shape or outline of garments (mean = 2.10; ±SD = 0.85). Following was illustrating texture of fabric (mean = 2.05; ±SD = 0.87). Both these items involve the texture of the specific fabric used for garments, which is challenging to convey without having had training in the rendering of texture, as a designer needs to be able to capture textiles, embellishments and construction elements as they relate to specific designs (Calderin 2013, p. 156).

Ranking third was the aspect of illustrating the shape or outline of garments (mean = 2.02; ±SD = 0.87) before considering the fabric to be used. All other items regarding the challenges experienced with different aspects of fashion drawing (including illustrating the correlation between a garment's front and back, details, openings, colour, hemline, style lines and 3D aspects) were regarded as a little to not difficult at all (mean <2).

Kurz (2010, p. 30) suggests that it is not only a challenge to manufacture interesting garments of a good quality, but also to communicate the aesthetics of intended designs. The result from this section agrees with literature, and contributes to the relevance of this study, as well as the substantial contribution, which it could have in illuminating the need that fashion entrepreneurs with no formal fashion-related training might have for training in fashion drawing skills. Table 3 illustrates the specific difficulties experienced by fashion entrepreneurs when drawing designs for clients.

Table 3: Difficulties with aspects of drawing

D.2.	When drawing a design, how much do you struggle with showing:	N	n	Very much (3)	A little (2)	Not at all (1)	Mean	±SD	Ranking order
D.2.1.	The outline or shape of the garment	105	n	40	27	38	2.02	0.87	3
			(%)	38.1	25.7	36.2			
D.2.2.	The seams (style lines)	105	n	38	24	43	1.95	0.88	5
			(%)	36.2	22.9	41.0			

D.2.3.	How the hem of the garment will hang	104	n	40	20	44	1.96	0.90	4
			(%)	38.5	19.2	42.3			
D.2.4.	How different fabrics make a garment hang/look differently	104	n	43	28	33	2.10	0.85	1
			(%)	41.3	26.9	31.7			
D.2.5.	The opening of a garment (e.g., zip or buttons)	104	n	38	17	49	1.89	0.91	7
			(%)	36.5	16.3	47.1			
D.2.6.	The colour of the garment	103	n	40	19	44	1.96	0.91	4
			(%)	38.8	18.4	42.7			
D.2.7.	The way a fabric looks and feels (e.g., smooth, shiny, rough, etc.)	104	n	42	35	37	2.05	0.87	2
			(%)	40.4	24.0	35.6			
D.2.8.	The details on the garment (e.g., pockets, pleats, beading, etc.)	105	n	38	14	53	1.86	0.92	8
			(%)	36.2	13.3	50.5			
D.2.9.	How the collar and sleeves stand away from the body and does not lay flat	105	n	38	13	54	1.85	0.93	9
			(%)	36.2	12.4	51.4			
D.2.10.	That the back and front of the garment is the same	105	n	38	19	48	1.90	0.90	6
			(%)	36.2	18.1	45.7			
D.2.11.	That all the parts of the garment looks even and straight	105	n	39	22	44	1.95	0.89	5
			(%)	37.1	21.0	41.9			

Importance of training in specific fashion-related skills

Most respondents (74.5% – 90.4%) regarded it very important for a fashion entrepreneur to be trained in specific fashion-related skills ($\alpha = 0.73$) (Table 4). With relevance to this paper, 89.4% of the respondents agreed that the finished garment should correspond with the original sketched design (mean = 2.88; \pm SD = 0.35), illustrating the importance of the inter-relationship between the design and the manufacturing of a product (Syrjäläinen & Seitamaa-Hakkarainen 2014, p. 31). Since the design of a garment can be seen as an agreement between client and designer, it is assumed that the client expects the outcome to be in accordance with the agreement. If this is not the case, the client might prove displeased with the product, which leads to client dissatisfaction.

Having the ability to sketch designs (mean = 2.83; \pm SD = 0.45) was regarded as an important role in fashion businesses, as it is a way of relaying accurate information to the client about the ideas or designs (Wiana 2014, p. 1). The importance of even basic training in fashion drawing can aid individuals in acquiring easy drawing techniques, which they can then apply in their fashion entrepreneurship (Xu 2016, p. 2).

A positive correlation was noted between supporting the importance of having the ability to accurately sketch a design (which subsequently, corresponds with the final item) and the respondents' beliefs in the importance of obtaining fashion-related skills through training ($r = 0.28$). This result provided evidence that irrespective of whether the respondents possess the ability to create fashion drawings, they consider the attainment of fashion drawing skills through training important. Table 4 depicts the respondents' views on the importance of training in fashion-related skills.

Table 4: The importance of training in specific fashion-related skills

E.1.	How important do you think it is:			N	n	Very important (3)	Important (2)	Not important (1)	Mean	±SD	Ranking order
E.1.1.	To have training in:	E.1.1.2.	Technical drawing (Showcard A)?	102	n	76	22	4	2.71	0.54	6
					(%)	74.5	21.6	3.9			
		E.1.1.3.	Fashion drawing (Showcard B)?	100	n	81	13	6	2.75	0.56	5
					(%)	81.0	13.0	6.0			
		E.1.1.4.	Sewing?	104	n	94	10	-	2.90	0.30	1
(%)	90.4				9.6	-					
E.1.1.5.	Pattern making?	105	n	91	3		2.86	0.38	3		
			(%)	86.7	12.4	1.0					
E.1.2.	To have the ability to sketch a design/idea?			105	n	90	12	3	2.83	0.45	4
					(%)	85.7	11.4	2.9			
E.1.3.	That the finished product (garment) is exactly the same as the sketch?			104	n	93	10	1	2.88	0.35	2
					(%)	89.4	9.6	1.0			

Use of fashion drawing as visual explanation aid between designer and client

Of the respondents, 96.2% confirmed that it is very important to possess the ability to draw sketches of intended designs, as it might aid in the process to communicate visually the designs to clients. This shows that despite respondents seldom making use of fashion drawing, they acknowledge that this method of visual communication plays an important role in depicting designs to clients.

Fashion drawing and client satisfaction

Most of the respondents (93.3%) believe that the ability to sketch a design enhances the level of client satisfaction. As consumers' needs are constantly updated (Bandinelli, d'Avolio & Rinaldi 2014, p. 1), drawing sketches of intended designs aid in reducing conceptual confusion between designer and client, regarding the specific design (Calderin 2013, p. 148). This agrees with literature, which indicates that a link exists between meeting the expectations of clients and client satisfaction (Koufteros, Rawski & Rupak 2010, p. 59), which is also important for the sustainability and profitability of fashion businesses (Nemati, Khan & Iftikhar 2010, p. 299).

Interest in receiving fashion drawing skills training

The majority of respondents (96.2%) are interested in receiving training to acquire fashion drawing skills. Literature states that small businesses are notably unwilling to undertake formal training, but individuals within these specific businesses might be more inclined to undertake informal training (Burns 2009, p. 39). The result from this specific question correlates with the statement from Burns, in the sense that respondents indicated the desire to undergo some form of training in fashion drawing skills.

Conclusion

As visual communication forms the basis for designers to communicate designs to clients, incorporating the use of fashion drawing skills plays an important role within fashion entrepreneurships.

The aim of this paper was to explore the fashion drawing skills training needs existing amongst fashion entrepreneurs without formal fashion-related training (within ELM). It was found that most respondents currently make use of commercially available fashion images, as visual communication method, and seldom make use of hand-drawn sketches. Most respondents find it challenging to illustrate aspects of a garment's design – specifically when depicting different fabric textures and the influence that textures have on the shape of garments. Most of the respondents indicated that they believed it to be of high importance that fashion entrepreneurs possess fashion drawing skills. Additionally, the ability to manually sketch designs will aid in the simplification of the communication process between themselves and their clients, as well as the enhancement of client satisfaction levels within their businesses. Overall, a positive inclination is noted amongst respondents, towards acquiring fashion drawing skills, indicating that respondents acknowledge the importance and potential benefit that fashion drawing skills may have within their fashion entrepreneurships.

The insights gained from this paper contribute to the existing body of knowledge regarding the need for occupation-specific skills within entrepreneurships and can serve as a basis for future researchers to develop training programmes to enhance the fashion drawing skills of fashion entrepreneurs.²

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² This research paper is based on the main author's master's dissertation.

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The spectrum of disability representation in new media

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Abstract

More than 650 million people worldwide suffer from a disability, be it visible or invisible. As a communication designer, I began to question the design of the International Symbol of Access – in particular, how it failed to represent invisible disabilities. As my investigation deepened, I encountered the full range of disabilities represented in YouTube™ advertisements. I purposively selected three YouTube™ advertisements created for Microsoft Xbox™, Consol™, and Toyota™, and within the broader scheme of Disability Studies, investigated how disability is used as a rhetorical appeal to gain empathy and strengthen the bonds between the viewer and brand. The selected advertisements promote three very different brand identities and products, but all feature a person with a disability. The language of media is rhetorical, and when combined with Disability Studies, is useful to develop an improved understanding of how visual and verbal arguments can impact the perception and representation of people with disabilities. I investigated the appeals, symbols, stigmas, and social meanings associated with disabilities and how they can lead to negative stereotyping. My findings reveal the selected sample displays a spectrum of narratives: the use of rhetoric as an analytical framework enabled me to move beyond merely identifying negative stereotypes and to engage with a more nuanced reading of the visual arguments. Consequently, a framework comprising three main models of disability emerged in the rhetoric of the advertisements. Each model represents disability in a different manner, but all three speak to the allure of disability as a device in media advertising that is becoming increasingly popular amongst advertisers.

Keywords: Disability, disability as tokenism, disability as endorsement, disability as representation, media representation.

Introduction

The language of media is rhetorical, and when combined with Disability studies, it is useful to develop a better understanding of how visual arguments can impact perceptions of disabled people. This study investigates, within the broader scheme of Disability Studies, three YouTube™ advertisements created for Consol™, Toyota™, and Microsoft Xbox™. Each advertisement features a person with a disability while promoting three completely different products and brand identities. This paper focuses on a nuanced reading of the visual and verbal arguments constructed in the mentioned advertisements. The use of rhetoric as an analytical framework enabled me to move beyond merely identifying negative stereotypes and focus on my experience of developing a framework comprising three models of disability representation; where each model represents disability differently, but all three models speak to the appeal of disability as a device in media advertising.

Jay Timothy Dolmage (2014, p. 2), in his book, *Disability rhetoric*, claims that “bodies continue to change, as do our attitudes about them, and rhetorical entailments of these bodily transformations continue to be

negotiated". Dolmage (2014, p. 2) argues that new technologies create the perception that humans can handpick their bodies, healing and perfecting them as desired. Technologies such as text messaging, scanners, and voice recognition software were first developed for people with disabilities and were created because humans are not entirely perfect. Thus, technology has not eradicated disability but is instead a driving force of contemporary Disability Studies that, according to Dolmage (2014, p. 2), is a field that aims to develop new relations and social structures through new rhetoric. Consequently, this paper contributes to Disability Studies and Theory discourse by addressing the contribution of technology, particularly that of new advertising streams such as YouTube™, and the consequential impact of disability rhetoric and representation.

Literature review

The term 'the disabled' can have multiple meanings or models. Tobin Siebers (2011, p. 3) mentions that, according to the Medical Model, disability is defined as "an individual defect lodged in a person, a defect that must be cured or eliminated if the person wants to achieve full capacity as a human being". However, Disability Studies focuses on "disability as a social injustice" (Siebers 2011, p. 3), steering away from the individual and any attempts to eliminate or cure the disability. Research in this field examines the stigmas, symbols, and social meanings associated with disability and how they can lead to negative stereotyping and oppression, which have different effects on the person with a disability. Disability Studies engages with disability in both a negative and positive manner. Siebers (2011, p. 4) argues that many disabled people do not wish to be cured. However, these same people may be hesitant about acquiring additional disabilities (Siebers 2011, p. 4). In addition, James Berger (in Fletcher & Primack 2017, p. 349) believes that the representation of disability produces feelings of vulnerability and mortality, forcing the abled bodied to confront the inevitability of disability. However, Siebers (2011, p. 3) views disability as a "minority identity", one that can add value in the form of diversity and claims that "the presence of disability creates a different picture of identity – one less stable than identities associated with gender, race, sexuality, nation and class".

A person cannot wake up one day and change his or her race; however, an abled-bodied person *can* wake up with a disability. Rosemarie Garland-Thomson (in Smith 2011, p. 4) argues that Disability Studies can benefit from feminist theory and vice versa. Garland-Thomson (in Fletcher & Primack 2017, p. 346) claims that "tropes of disability direct stigmas to different marginalised populations", for example, depicting women as biologically inferior to men, thus, framing females as disabled compared to able-bodied males (Fletcher & Primack 2017, p. 346). Garland-Thomson (2002, p. 2) extends this view to state that "feminist issues are intricately entangled with disability"; both femininity and disability involve issues of the body, cultural and social hierarchy, discrimination, identity and inequality (Smith 2004, p. 2). Feminist-disability Theory emerged from pairing feminist principles and the social model of disability (Heiss 2011), and makes the assumption that the female body does not lead to oppression, but rather that social practices privilege able-bodied males, which marginalises females with disabilities. Disability and Gender identity are, therefore, both constructed by various internal and external forces such as desire and cultural codes; consequently, Feminist-disability Theory aims to create positive identities for that have been oppressed.

Sarah Heiss (2011) (Figure 1) explores the connection between disability and gender by analysing the Dove™ Campaign for Real Beauty. The campaign was launched in 2004, and Dove™ claimed to have developed a better understanding of females' attitudes toward their well-being and beauty. However, Heiss (2011) argues that by choosing to omit certain bodies, specifically disabled females, Dove™ in fact reinforces traditional understandings of beauty and the body because the campaign excludes the aesthetic value and experience of many women with different body types. Heiss (2011) concludes that the advertisement contributes to the idea of normalcy for females and negates the idea of the general understanding of the disabled body.



Figure 1: Ogilvy & Mather (design agency), Dove™ Campaign for Real Beauty, billboard advertisement (2004) (Olsen 2008, s.p.)

Representing people with disabilities in advertising can allow advertisers to tap into a potential market (Cox 2016, p. 14); however, the theoretical lens through which one observes disability in the twenty-first century is influential in positioning people with disabilities as a “target market segment ripe for commodification and economic exploitation” (DePoy & Gilson 2013, p. 489). Anne Christopher (2013, p. 773) claims that “advertising is pervasive”, and the presence of disability in media, even when represented in a neutral manner, can lead to attitudinal changes of the abled towards the disabled (Panol & McBride in Cox 2016, p. 14-15). Christopher (2013, p. 778) credits the repetition of slogan messages for the success of previous television advertisements. The repetition of messages in more recent media is similar to that of ‘sharing’ content on social media platforms; “sharing”, according to Tellis et al. (2019), can have a considerable impact on the number of views a particular advertisement may receive on a social media platform such as YouTube™.

YouTube™ is a social networking site that enables users to “create online communities, share information, ideas, and personal messages” and allows “brands to connect with and inform consumers worldwide” (Kujur & Singh 2018, p. 184-185). As of January 2017, advertisers were able to target specific YouTube™ users based on their Google™ search history and YouTube™ viewing behaviours (Oetting 2022). Marketers aim advertisements at people who recently searched for a particular product or service, thus increasing the chances that the viewers watch the entire advertisement or click through to the advertised brand’s website (Oetting 2022). Viewers are actively engaging with YouTube™ and do not necessarily mind watching the advertisements, as 72% of in-stream advertisements are watched to the end (Patel 2021). Benefits of YouTube™ advertising therefore include customisation capabilities, targeting, affordability, and measurability (Bauer 2023). Similar to television commercials, YouTube™ advertisements have the means to create “evoking identifications” (Blair 2007, p. 356). Unlike static imagery, videos allow the viewer to experience an entire drama. Television commercials, like YouTube™ advertisements, provide viewers with a plot, character development, crisis, and climax (Blair 2007, p. 356). Advertisers can upload longer advertisements, allowing a story to unfold, and increasing the chances of evoking strong emotions. This *emotional-focused* content, in my opinion, evokes both negative and positive emotions, ultimately affecting a consumer’s attitude towards the advertised brand, a view that is supported by Tellis et al. (2019). This led me to question the idea of disability as a rhetorical appeal to gain empathy from viewers to promote brands and their products.

The definition of rhetoric is one that has been continuously challenged. Classical rhetoric involves the audience and focuses on argumentation as a democratic form of governance (van Belle 2013, p. 10). Richard Buchanan (1989, p. 93) defines rhetoric as the “art of shaping society, changing the course of individuals and communities, and setting patterns for new actions” and views technology as a rhetorical appeal within the theory of rhetoric design. To this effect, I draw on arguments presented by Dolmage (2014, p. 2), who defines rhetoric as the study of all forms of communication, claiming that:

...rhetoricians foreground the persuasive potential of all texts and artefacts, questioning the sedimentation of meanings, recognising the constant negotiations between the author and audiences, and linking language to power.

The arguments presented by Dolmage (2014) are particularly important to this study as they address the link between Disability Studies, technology, and rhetoric. Dolmage (2014, p. 2-3) believes that “futuristic disability studies will not be about the eradication of disability, but about new social structures and relations, made possible by new rhetorics”, and emphasises the relationship between rhetoric and Disability Studies. Dolmage (2014, p. 3) suggests that Disability Studies needs rhetoric to better understand how arguments of representation can impact the experience of people with disabilities, while rhetoric needs Disability Studies to serve as a reminder to pay attention to the body.

Methodology

The broad theoretical framework of this study engages with Disability Studies and Theory, Disability and Gender, Disability and Rhetoric, and Disability and Advertising. Primary data was collected by analysing a sample of YouTube™ advertisements, whilst secondary data was collected through a literature review that draws on both hard copy and digital sources. I purposively selected advertisements promoting well-established brands whilst featuring people with disabilities. The three chosen advertisements were created by reputable design agencies and are available on a variety of platforms, including YouTube™.

Although the advertisements were purposively selected for featuring people with disabilities, Microsoft Xbox™, ConsoI™ and Toyota™ are promoting three very different products and brand identities. The Microsoft Xbox™ advertisement promotes the Xbox™ Adaptive Controller – a gaming device specifically created for those with disabilities or limited mobility (Xbox 2018), whereas the advertisement created for ConsoI™, a manufacturing company specialising in glass containers, is not targeting disabled people as such, but rather consumers in general. Toyota™, on the other hand, is promoting its shift from an “automobile to a mobility company that highlights real-life mobility stories” (Start you impossible, s.a.) in addition to promoting the partnership between Toyota™, the Olympics and Paralympics (van Zyl 2019).

The Microsoft Xbox™ Adaptive Controller advertisement, titled *We all win* (Microsoft: we all win... 2019) (Figure 2), centres on a group of children, with limited mobility, and their parents as they discuss the struggles they face as disabled video gamers when attempting to use the regular Xbox™ controller, as opposed to the benefits and practicality of the Xbox™ Adaptive Controller (Microsoft: we all win... 2019).



Figure 2: M:united/McCann (design agency), Microsoft™ Xbox We all win (Microsoft: we all win... 2019)

The second advertisement, *the best things come in glass* (2017), is a South African-produced advertisement that earned second place on SA's most liked TV ads (Grey Africa 2018). The narrative, at first, is somewhat puzzling, as it depicts the protagonist, a young girl, running around a playground with an empty Consol™ jar (Figure 3). However, the surprising reveal towards the end of the advertisement helps make sense of the girl's actions.



Figure 3: Grey (design agency), Consol™ The best things come in glass (Consol glass & Grey 2018)

The third advertisement forms part of Toyota's larger, global *Start your impossible* campaign (Figure 4) and provides a glimpse into the backstory of young South African Paralympic medalist Ntando Mahlangu, while highlighting the eight-year partnership between Toyota™, the Olympics, and Paralympics (van Zyl 2019).

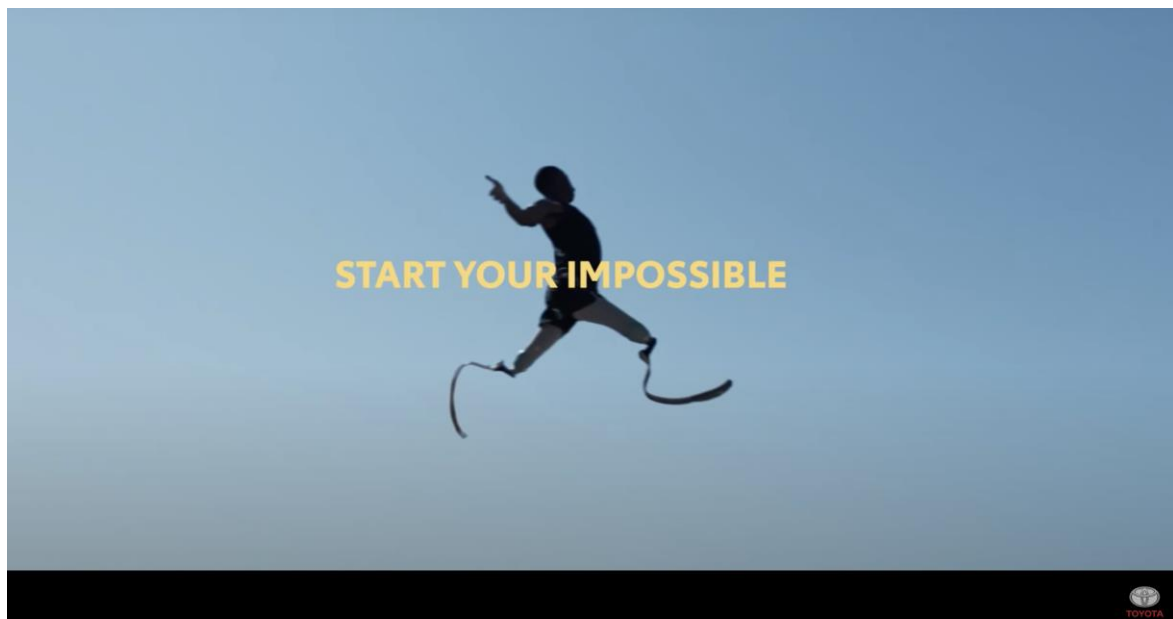


Figure 4: FCB (design agency), Toyota™ Start your impossible (van Zyl 2019)

As the three advertisements are analysed in tandem, the rhetoric approach aims to reveal the available means of persuasion at any given moment and is used in either a rational, ethical, or emotional manner (Ehse 2004, p. 165). Buchanan (1989, p. 96) defines logos as the rational appeal or “element of technical reasoning”, arguing that logos are successful in persuading an audience when “reasoning is clear and provides a likely solution to a problem”. Ethos, the ethical appeal, refers to the character, and credibility of a design; Buchanan (1989, p. 98) believes that “character can be a subtle mode of persuasion, but is extremely important for design”. The pathos or emotional appeal is a “mode of persuasive communication that serves a broader argument” and involves persuading an audience that a particular product is “emotionally desirable and valuable in their lives” (Buchanan 1989, p. 103).

Marguerite Helmers and Charles Hill (2008, p. 2) note that rhetoricians work from a variety of disciplines through an analysis of “photographs and drawings, graphs and tables [...] motion pictures [...] and visual images on the internet”. Helmers and Hill (2008, p. 5) do not reference classical figures of rhetoric such as logos, ethos and pathos, but by examining a photograph – Thomas Franklin’s *Firefighters at Ground Zero* (2001) – identify several “modes of interpretation”, including intertextuality, symbolism, time, nostalgia and gender.

Ehse (2004) argues that the objective of rhetoric is eloquence, which leads to the influence of actions. The idea of being influenced, or the possibility of influencing, implies the prospect of choice. Choice is viewed as a key idea in both design and rhetoric, as both relate to making the “appropriate selections of means to achieve a desired end” (Ehse 2004, p. 165). Petra Aczél (2013, p. 307) argues that traditional rhetoric theory has been challenged by the phenomena of new media interactivity, hypermediacy, and the rise of a “communicative culture” – a culture portrayed by permanent connectivity, participation, and publicity. New media refers to new interfaces, spaces and technology that allow for greater user engagement and user choice (Aczél 2023), suggesting that users have “on-

demand access to content anytime, anywhere, on any digital device, as well as interactive user feedback, and creative participation” (Pleios 2013, p. 8-9).

I applied various rhetorical strategies to determine each advertisement’s logos, ethos, pathos, and kairos appeal. The theoretical framework is based predominately on Disability Studies and Theory, in particular the findings of Barnes (1992) that suggest that most stereotypes and representations of disabled people in media are negative. However, the use of rhetoric as an analytical framework enabled me to move beyond merely identifying negative stereotypes and to engage with a more nuanced reading of the visual and verbal arguments constructed in the sample. Consequently, although this was not a research objective at the outset of the study, a framework comprising three main models of disability emerged in the rhetoric of the advertisements, namely disability as tokenism, disability as representation and disability as endorsement. The resulting framework speaks to the allure of disability as a device in media advertising that is becoming increasingly popular amongst advertisers.

In order to complete the rhetorical analysis, I created a framework presented as a flow diagram with two primary levels (Figure 5). The top level comprises the four main rhetorical appeals, logos, ethos, pathos (defined above) and kairos – that within the context of this study refers to the timeliness of the argument. The second level comprises the headings used for each of the rhetorical appeals. The analytical categories of product information, showcasing the product and logo, statistics, avant-garde products, weasel words – which are words commonly used in advertising to “avoid making direct statements” (Flynn 2018, s.p.) – are placed under Logos. Ethos addresses issues related to the credibility, trustworthiness, and reliability of the brand, character, and audience respectively. Pathos, the emotional appeal, addresses issues related to the portrayal of emotions, the ability of the characters to display emotions, the emotions advertisers wish to evoke, and the actual emotions experienced by the researcher when viewing the advertisement. Lastly, Kairos includes the appropriateness of the setting, structure, tone, and address issues related to the duration of the advisement. The information gathered by applying the analytical framework is not based on interviews with the respective advertising agencies or a larger audience but is instead the researcher’s own subjective response to the advertisements.

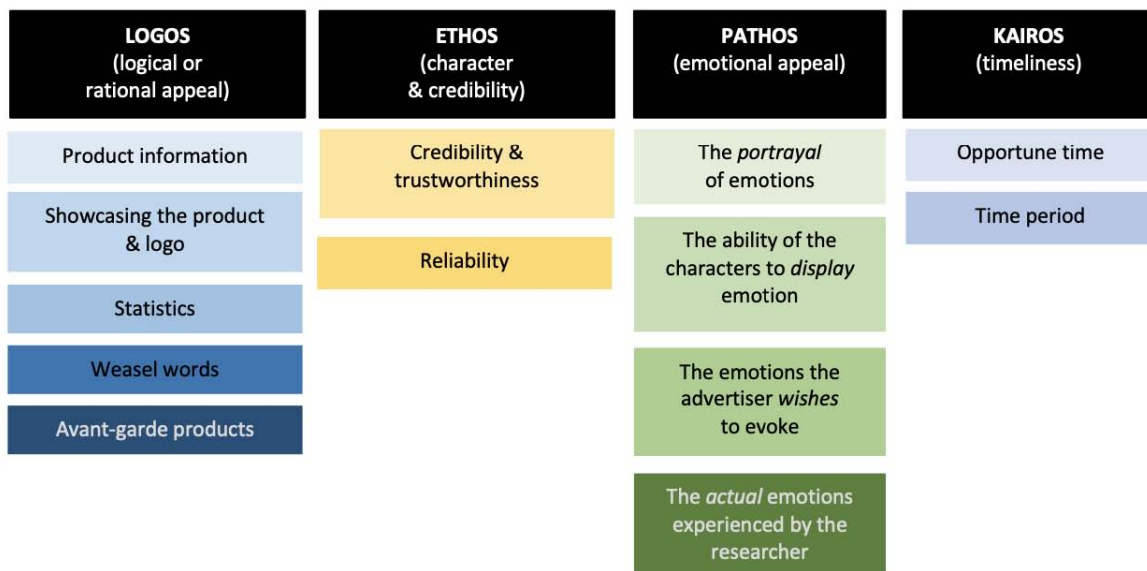


Figure 5: Analytical framework 2020 (constructed by author)

An overview of the findings

Microsoft Xbox™: We all win

The 1min 57 sec documentary-style advertisement centres around six mobility-impaired adolescent gamers and provides a platform for the individuals and their parents to discuss and compare the regular and Adaptive Xbox™ controllers. The advertisement, with the use of the word *regular*, highlights that it is accepted that most designs are created for able-bodied users, thus reinforcing the Disability Theory premise that disability is a result of the social and built environment that does not accommodate impairments (Siebers 2011). The advertisement utilises various stylistic approaches to enhance the logo's appeal, including a before-and-after narrative structure, product repetition, weasel words, and the promotion of an avant-garde product. It displays the highest logos in the sample, because it demonstrates that the Adaptive Controller provides mobility-impaired gamers with a physical product that improves their gaming capabilities, thereby allowing users with disabilities to perform as well as able-bodied gamers.

Consol™: The best things come in glass

The South African-produced Consol™ advertisement tells the story of a young girl as she happily runs around an outdoor playground with an empty Consol™ jar, collecting and *bottling up* joyful sounds in order to share the experience with her visually impaired grandmother. The highly emotive, dramatised advertisement draws on various compelling and persuasive film techniques, including a surprising twist in the story in an attempt to evoke positive emotions. The advertisement entrancingly advertises and existing, but otherwise unglamorous, physical product. Although it promotes the Consol™ jar within a narrative that gives it an appearance of an avant-garde product, the advertisement still exhibits low logos as it fails to include adequate logical product information. While high in pathos, the advertisement has a relatively low ethos appeal, since the young girl *appears* to be of good character and embodies childlike innocence, but neither the caregiver nor the grandmother provides overt testimonials to support this impression. Rather, the positive representation of the young girl relies on the negative representation of people with disabilities.

Toyota™: Start your impossible

The cinematic advertisement focuses on South African Paralympic medallist and Toyota™ ambassador Ntando Mahlangu. The advertisement narrates the mobility backstory of Mahlangu but was created to emphasise Toyota's brand identity shift and highlight their partnership with the Olympic and Paralympic Games committees.

This advertisement is not promoting a specific product, but reinforces the brand shift by continuously displaying the Toyota™ logo. The highly emotive advertisement features evocative imagery and dialogue, thus elevating the pathos appeal. The advertisement, and therefore the brand, is forcefully endorsed by Mahlangu and capitalises on his personal mobility story without directly claiming that Toyota™ has been of any assistance to the athlete.

Models of disability

Disability as tokenism

Disability as tokenism refers to the superficial inclusion and representation of the disabled in an attempt to appear inclusive and "often results in a number of setbacks for the represented culture" (Medina, in Podoshen et al. 2021, p. 132). Barnes (1992) presents various oppressive stereotypes on

which this model is based, arguing that the media portrays the disabled as pitiable, pathetic, and incapable. This model is therefore perceived as negative and continues to misrepresent people with disabilities.

The Consol™ advertisement, by including the visually impaired grandmother – seemingly physically and emotionally trapped by her disability and therefore presented as flawed and unable to engage with the community (Barnes 1992) – falls into this model. The advertisement focuses on stereotypes associated with the medical model of disability and portrays the visually impaired as a group that should be isolated. The Consol™ advertisement draws on and reinforces pre-existing negative perceptions that “disabled people’s inability to interact in normal life [is] a direct result of their physical and/or mental impairment” (Pirsl, Pirsl & Randjelovic 2012, p. 536). Thus, the Consol™ advertisement fails to depict the visually impaired or people with disabilities as a minority group that can make meaningful contributions.

Moreover, the inclusion of the disabled grandmother is introduced as a deliberate device to offset the young girl’s “goodness and sensitivity” (Barnes 1992), as well as to suggest that Consol™, a manufacturer of products that are cold and clinical, is attempting to appear to be a brand with a sense of warmth. Therefore, the character with a disability is simply included for institutional benefit (Mashburn & Papalia, in Podoshen et al. 2021, p. 132).

Disability as representation

The disability as representation model is aligned with the social model of disability that assumes that “disability is a social injustice” (Siebers 2011, p. 3). Being disabled is not the problem; instead, the world is unfairly designed to privilege able-bodied individuals. Disability as representation, therefore, aims to promote more accurate portrayals of people with disabilities, and features the disabled both positively and negatively.

The Xbox™ advertisement uses this model as it demonstrates the real-life struggles gamers with mobility impairments may face when attempting to use a device designed for able-bodied users. The advertisement acknowledges that various groups of people – in this case, people with mobility impairments, have different needs that must be met to achieve some level of equity. The protagonists are multi-dimensional, disabled individuals with a sense of identity. The mobility-impaired gamers are actively engaging in social activities, suggesting that they are part of a community and reject a negative disability stereotype.

The disability as representation model is more accurate than disability as tokenism, and does not utilise stereotypes that can be regarded as “super cripple” (Barnes 1992). Barnes (1992) uses the term ‘super cripple’ in reference to the idea that, to be viewed as successful, people with disabilities must acquire *super* qualities to compensate for their disability, suggesting that a visually impaired individual must acquire *super* hearing. Rather, disability as representation is educational and makes a “transformational effort that more fully embraces removing the barriers contributing to inequality” (Mashburn & Papalia, in Podoshen et al. 2021, p. 132). The protagonists in the Xbox™ advertisement positively identify with their disability identity, leading to an improvement in their quality of life – specifically their gaming capabilities.

Disability as endorsement

The disability as endorsement model is based on the concept of brand endorsements, specifically by individuals viewed as celebrities or inspirational figures. This model is less stable than disability as tokenism or representation because the audience’s perception of the celebrity fluctuates. This model

relies on featuring celebrities' personal and professional lives that become the embodiment of the brand, thus blurring the lines between brand and endorser.

Disability as endorsement has advantages and disadvantages. Celebrity endorsements create the perception that the advertised brand is superior because it is endorsed by an apparently credible witness (Pedhiwal 2011), allowing the featured brand to 'hide behind' the celebrity (Eragula & Jeksani 2016, p. 2172). However, brand endorsements have certain drawbacks. The audience could negatively perceive the endorser and, consequently, mistrust the brand (Eragula & Jeksani 2016, p. 2172). The success rate of the endorser's career is uncertain – Mahlangu could win gold during one race and fail to qualify for another, which would affect the perception of the advertised brand. Lastly, advertisements could be considered controversial, resulting in an unfavourable image of the endorser (Eragula & Jeksani 2016, p. 2173).

Thus, the Toyota™ advertisement capitalises on the story and endorsement of Mahlangu to highlight Toyota's identity shift and partnership with the Olympic and Paralympic committees. However, the brand is kept deliberately vague, and the narrative only indirectly suggests that Toyota™ contributes to the athlete's success, and therefore is associated with Mahlangu's achievements without directly claiming to assist the athlete. This model can either defy or enhance negative stereotypes but relies on portraying the disabled as "super cripple[s]" (Barnes 1992). Disabled celebrities are God-like and their achievements, therefore, unattainable.

Conclusion

Pirsl et al. (2012) contend that, owing to its vital role in disseminating information to a broad audience, mass media contributes to the discrimination of people with disabilities. However, my findings suggest that the representation of the disabled is not necessarily negative but rather that the sample displays a spectrum of narratives, representing disability in different ways, ranging from positive to negative representations.

Devlin and Pothier (2006) argue that the world is constructed based on able-bodied norms and one's ability to be productive and contribute, suggesting that the goal of Critical Disability Theory is to challenge this belief. This argument is important as it helped form the bases for the disability framework applied in this study. Siebers (2011) believes that it is important to recognise the value and variety of disability as this can assist in reversing the negative assumptions tied to disability, and argues that, similar to feminism and queer identity, if one positively identifies with minorities, it can lead to an improvement in the quality of life for the disabled individual. To this purpose, the proposed disability framework could be expanded from the three models discussed here and applied to a larger sample to make visible how various tropes are used in media representations.

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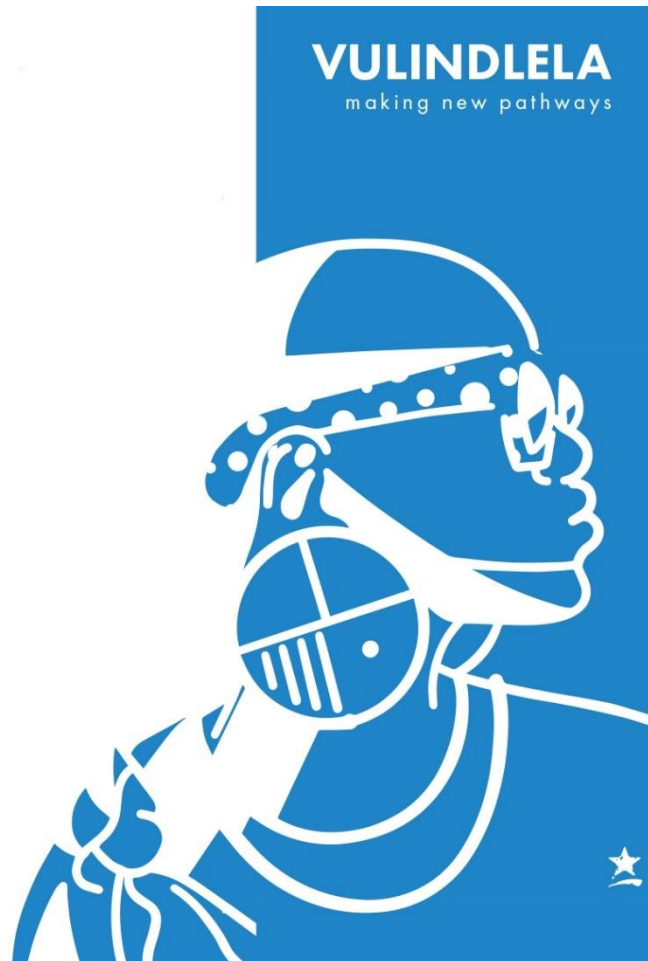
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SESSION 2: Doing





Vulindlela – making new pathways

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Communication design industry – in search of unicorns or new pathways?

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Abstract

An integral part of curriculum design is continuously reviewing workplace and industry needs and requirements. International design research and research of a general nature provide some guidance for curriculum developers and lecturers, but research on the local design industry is fragmented and scarce. This lack of available and rigorous research on the local design industry provides a gap for this paper that explores the nature, needs, and requirements of the local design industry and the changing career pathways of designers.

This paper focuses on the broad communication, multimedia, digital and experience design fields. It starts with a literature review of the changes in this space to provide a theoretical grounding for the paper. This is followed by a thematic analysis of recruitment adverts collected in 2023 that looks at industry needs, job titles and levels, attributes, knowledge and skills, and the qualifications listed as the minimum requirement. Findings point to a fast-evolving workplace, shifts away from traditional agencies, demand for wide-ranging skill sets, more strategic alignment with business, flexibility and a focus on users. The need to understand users and the ability to conduct research are becoming critical requirements, as well as flexibility and the ability to work in teams. The analysis also highlights inconsistencies in job titles and unrealistic expectations.

The contribution of this research provides a snapshot of a fast-changing industry and a baseline for future comparisons that can guide design educators.

Keywords: Communication, design industry, digital and experience design, employment requirements.

Introduction

Technology is creating new opportunities and challenges in the world of work, potentially rendering existing jobs obsolete and creating new ones that are, as yet, ill-defined (Xing, Marwala & Marwala 2018). Continuously reviewing industry needs and requirements is integral to curriculum design as higher education institutions grapple with their role in developing the mindsets and skill sets needed in the future world of work (Makwela & Olalere 2021, p. 92). International design research provides some guidance, but research on the local design industry is fragmented and scarce, providing a gap for this paper that explores the nature, needs, and requirements of the local design industry and the

changing career pathways of designers in the broad communication design and expanded fields to inform relevant, appropriate design curricula.

Buchanan's (1998) design matrix provides a theoretical starting point for explaining these shifts within the context of the evolution of design and historical socio-technological changes. A thematic analysis of recruitment adverts collected in 2023 looks at industry needs, job titles and levels, attributes, knowledge and skills, and the type of qualifications listed as minimum requirements to better understand the current local workplace.

Design: an evolving discipline

Seminal design author Richard Buchanan characterised the evolution of design as it encountered new problems in his seminal design matrix (Buchanan 1998, p. 13). He describes design in four broad domains of design thinking: Design in the first domain entails an interest in symbols and the communication of information through words and images, while design in the second domain is concerned with the construction of tangible, physical things (Buchanan 1998). Design in the third domain is concerned with strategic planning and deals with interactions and experiences, whereas design in the fourth domain is concerned with systemic integration and deals with complex systems and environments for living, working, playing, and learning (Buchanan 1998). The domains expand without one replacing another, representing a widening of the domain of design, as can be seen in Figure 1.

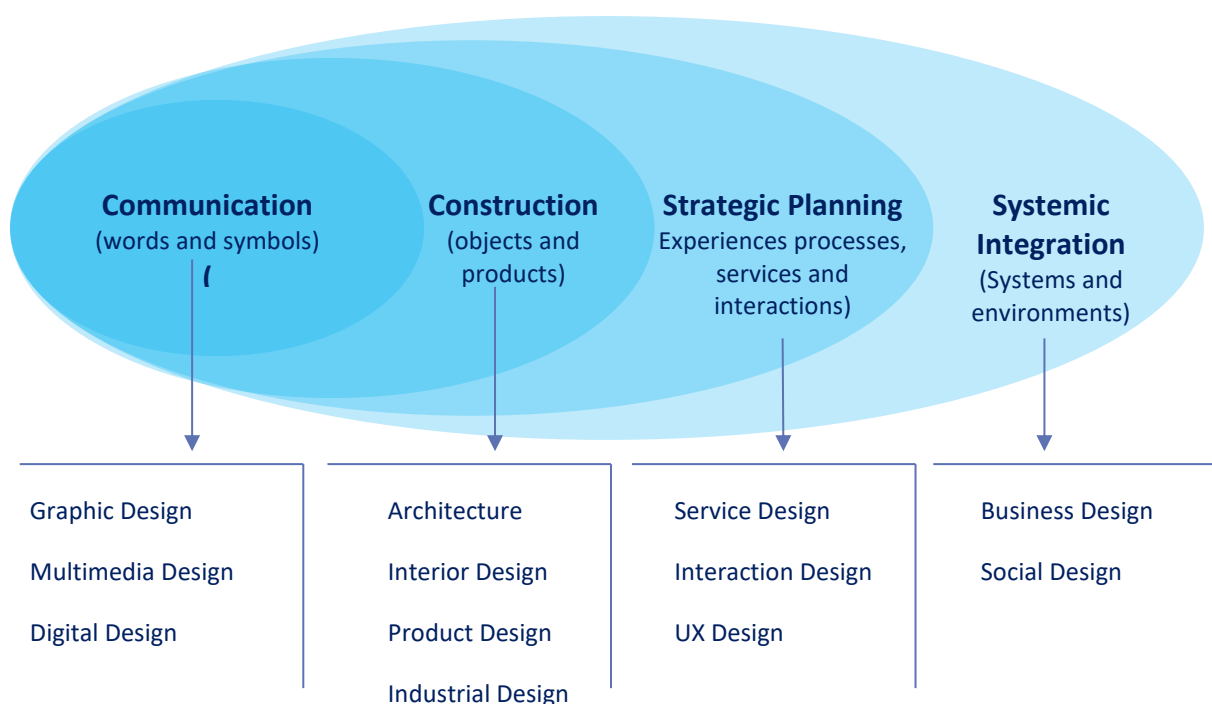


Figure 1: Shifts in the discipline of design according to Buchanan's (1998) domains of design (Adjusted by authors)

The significance of Buchanan's model, first presented in 1994,¹ can be seen in how design evolved and developed over the last 30 years. The evolution of design has coincided with historical global socio-

¹ First presented as a keynote address titled 'Branzi's dilemma: design', *Proceedings of the Contemporary Culture at the Design: Pleasure of Responsibility Conference*, Helsinki, June 1994 (Buchanan, Doordan & Margolin 2010, p. 13).

economical shifts brought about by the emergence and development of new technologies (García Ferrari 2017). Mechanisation in the production and distribution of goods and a need to push products to market (Thurik, Stam & Audretsch 2013), brought on by the first industrial revolution, resulted in a focus on function and form and a need for knowledge of materials and processes in Design (Manzini 2015; Roxburg & Cox 2015). The invention of electricity and the internal combustion engine in the late 19th century heralded the second industrial revolution (Schwab 2017). This era also saw the establishment of design as a formal discipline in schools like the Bauhaus and the Ulm Hochschule für Gestaltung in the first half of the 20th century (García Ferrari 2017, p. S627).

Following World War 2, global industrialisation and mass production resulted in the establishment of large corporations that leveraged the economies of scale made possible by technology to produce goods cheaper and faster (Thurik, Stam & Audretsch 2013). As goods became cheaper to manufacture and easier to copy, companies needed to find new, less tangible ways to differentiate (Thurik, Stam & Audretsch 2013). Consequently, design became concerned with a consideration of how customers form emotional connections with brands and how they use products. Designers now needed knowledge of ergonomics to make user-friendly products and communication studies to generate engaging creative concepts (Roxburg & Cox 2015). Television, computers, and the internet altered the meaning of distance and time, made information widely accessible and making participation in the global economy possible for nearly everybody. Increased connectedness and access to knowledge gave rise to consumer demands for greater variety and customisation (Thurik, Stam & Audretsch 2013), requiring designers to strategically plan how users might interact with and experience designed products. The focus on design shifted from how things should be designed, to how users might interact with and experience things, giving rise to new design fields such as Service Design, Interaction Design, and Experience Design (García Ferrari 2017). Digital technologies have changed the way designers work, putting the tools of production in their hands and expanding the field of Graphic Design to include digital media (Adobe Experience Cloud 2018).

A shift resulting from the ubiquity of mobile and smart technology and embedded interconnectivity throughout society is changing how people experience and make sense of the world (Schwab 2017). This interconnectedness has resulted in complex, networked social and economic problems that require systemic approaches and intradisciplinary collaboration (Dorst 2018). Within this context, the focus of design is expanding to include complex systems, for example, in business design and social innovation (García Ferrari 2017). Accompanying the latest evolution of design is a shift in designers' roles from shape-givers to facilitators of creativity and seeding of systems (Calabretta & Kleinsmann 2017; Sanders 2017). Design is becoming a co-creative practice requiring wide-ranging skill sets, adaptability, an ability to work in teams and a critical consideration for local context (Manzini 2015). Norman (2017) describes design as at a crossroads, design as a craft or practice of design as evidence-based discipline and way of thinking.

In South Africa, design as a recognised discipline has a young history. The first graphic and industrial design diplomas were introduced in Technical Colleges in the mid-1960s, and universities only started offering degree qualifications in the 1980s (Sutherland 2004; Campbell 2008). Design only became a recognised field of research in South Africa in the late 1980s and 1990s (Sutherland 2004). The relatively young status of design as a recognised discipline in South Africa may play a role in design qualifications offered in academic institutions lagging slightly behind the fast-evolving requirements of the local design industry – qualifications specifically in UX design, for example, do not yet exist in South Africa. Yet, there are many recruitment adverts for UX/UI designers.

Methodology

Recruitment adverts were collected during June 2023 from the Indeed and LinkedIn platforms using graphic design, digital design and user interaction (UI) and user experience (UX) (combined as UI/UX design) as search words. Terms such as ‘multimedia design’ and ‘communication’ design yielded no additional results. The adverts in the search pool were divided into three categories: graphic design, digital design, and UI/UX design based on the description of the nature of the position and qualifications needed. These categories as 'spaces' in this paper, based on the blurring of boundaries between them. Inappropriate adverts were discarded (such as the more production-oriented jobs at printshops and in-house positions with printing and reproduction as a core part of the scope, also adverts for design with engineering or IT qualification and programming as a requirement). Twenty adverts in each space were then selected, indexed, numbered and pulled into AtlasTi for thematic analysis. A prefix GD, DD and UIUX followed by a number to create a unique reference. The themes identified during coding are job titles, qualifications, software and technology skills, attributes and soft skills, industry expectations and requirements (with subthemes: research, review and testing requirements, teamwork and collaboration and the strategic role). Divining the job adverts into three spaces allows for comparisons and the identification of similarities and patterns. However, the blurred boundaries between these spaces and inconsistent use of terminology in the job adverts must be recognised upfront.

Findings

Job titles

A wide range of job titles is used, often with combinations that indicate the type of designer wanted. Some job titles seem contradictory or even impossible, while others do not align with the job specifications. Some Digital Design adverts, for example, refer to graphic design produced with digital tools such as InDesign, Illustrator, and Photoshop, rather than design for digital media. The terms Digital, Web and Graphic Design often occur in different combinations (Figure 2). The UI/UX area uses UX or UI interchangeably.

		COMMUNICATION DESIGN		EXPERIENCE DESIGN
	Graphic Design	Digital Design	UI/UX Design	
Most	<ul style="list-style-type: none"> Graphic Designer (13) 	<ul style="list-style-type: none"> Digital Designer (10) 	<ul style="list-style-type: none"> UI/UX or UX/UI Designer (7) UI Designer and UX Designer Product designer Figma UI/UX Designer 	
Combinations	<ul style="list-style-type: none"> Social Media Designer Web Designer & Graphic Designer Graphic & Web Designer Marketing and Graphic Design Brand and Creative Specialist Design, media and marketing manager Digital Branding & Graphic Design 	<ul style="list-style-type: none"> Digital Graphic Designer Digital Designer & Social Media Manager Motion Designer Motion Graphics Designer/Animator Motion Graphics Designer & Videographer Web Designer HTML Email & Digital/Graphic Designer 	<ul style="list-style-type: none"> UX/UI Graphic Designer Digital Design and Architecture Software Developer UX, UI and Research practitioner Product Trainer – Content Specialist & UI/UX Designer 	
	The job specifications between these two are often a mix and match between skills and media.			

Figure 2: Job titles divided into three spaces

Qualifications

All the adverts require applicants to have some form of qualification, with bachelor's degrees and diplomas often unspecified. Words such as such as relevant or suitable describe the type of qualification. Qualifications in Graphic Design are often mentioned for Digital and Experience design positions. A skill is often listed rather than a qualification.

Although the industry is clear about the nature of what the UI/UX designer should be able to do, it recognises that no UI/UX-specific qualifications exist yet and either does not mention a particular degree, or lists Graphic Design plus UI/UX, HCI, or product design² as qualification requirements (Figure 3).

	Graphic Design	Digital Design	UI/UX Design
Unspecified			
Bachelor's degree (Relevant)	4	5	4
Diploma or equivalent in the design field	4	0	1
Certificate	1	1	0
Graphic Design			
Bachelor's degree in Graphic Design or related field.	6	4	0
Tertiary Visual Communication qualification	0	1	0
Certificate /Diploma in Graphic Design	1	0	0
Degree in Graphic Design and/or marketing	3	0	0
Degree in Graphic Design +UI/UX Design	0	0	2
Bachelor's degree in Graphic Design + Human-Computer Interaction	0	0	1
Bachelor's degree in Product Design, Graphic Design	0	0	1
Digital Design			
Bachelor Degree or Diploma in Digital Design	0	2	0
Animation/Digital Design	0	2	0
Bachelor's degree in Web development or related field	0	2	0
Digital design qualification, including HTML (a must)	0	1	0
Addition/Advantage			
Additional in Videography	0	2	0
Additional in UX	0	1	0
Additional Social Media Management Certificate	1	0	0
Certified Usability Analyst (CUA)	0	0	1

Figure 3: Qualifications

All adverts require a portfolio of work and usually ask for specific examples of the type of work they expect the designer to do, such as brand identity, websites, or social media. In the UI/UX space, some

² The term product design here refers to digital products, and not the outcomes of industrial design.

adverts require case studies of own work. This requirement reflects the shift to design outcomes that are less tangible with a more strategic focus, and that is often done in multidisciplinary teams.

Attributes and soft skills

The attributes and soft skills are distributed very similarly across the three spaces and a comparison between these would be superfluous. The 20 most listed personal attributes and soft skills are summarised in Figure 3. The top three require designers to be good communicators (verbal and written), collaborators and be able to work independently.

General soft skills/competencies	Character qualities	Design Industry specific competencies
<ul style="list-style-type: none"> • Communication skills • Teamwork /collaboration • Independent /self-motivated • Self-management • Problem-solving/initiative • Ambition and drive • Interpersonal skills • Work under pressure 	<ul style="list-style-type: none"> • Stay up to date/willing to learn/Curious • Creativity • Passion for... (the different design areas) • Positive attitude • Adaptability/flexibility 	<ul style="list-style-type: none"> • Manage time/Meet deadlines • Accurate and attentive to detail • Productive: Work fast and efficiently, Prioritise/multitask • Work ethics/Integrity/accountability/professional conduct • Organisational/planning skills, work methodically • Listen and follow instructions/Take Guidance • Dedication/hard work as a designer

Figure 4: Top 20 attributes and soft skills

The attributes and soft skills needed by industry appear similar to the competencies and character qualities identified by the World Economic Forum (WEF) as essential 21st-century skills (Soffel 2016). The WEF differentiate between foundational literacies, competencies (to approach complex challenges) and character qualities (Soffel 2016). A similar division is used in this study, with a separate column added that reflects the pressures of the design industry, such as the abilities to meet deadlines, to multitask, pay attention to detail, to plan and solve problems. Other often-mentioned attributes include adaptability, flexibility, and creativity. Many job adverts list a passion and love for what designers are expected to do. The industry wants enthusiastic, positive designers who are flexible and can work or even "thrive" (GD11) under pressure in a fast-paced, deadline-driven environment.

Technical and software requirements

All the job adverts require designers to be technically proficient. This proficiency is not limited to specific design software but includes Microsoft Office and other technical proficiencies such as file management and archiving. Some adverts ask for industry-standard software, but most are rather particular about the specific software or even specify Mac or PC. Adobe's Creative Cloud is essential, with Photoshop, InDesign and Illustrator dominant for Graphic and Digital Design. Premiere Pro and AfterEffects are listed more often in the Digital Design area, as well as HTML/CSS/Java proficiencies. WordPress features in both Graphic and Digital Design, and some employers specifically list Elementor (a WordPress Builder) and the ability to maintain WordPress sites (back and front end) as a requirement.

Animation and motion design abilities feature in many Digital Design adverts, mainly for web and social media, with skills to work with sound and voice-overs. Few specialised 3D needs and applications are listed (such as Cinema 4D), which could be because the search did not focus on this area. CorelDraw was only listed in some of the printshop adverts that were excluded from the study.

Only one job advert in the sample was for television production, requiring outcomes such as title sequences and the ability to art direct 3D (DD13). (Figure 5 provides a snapshot of the most mentioned design software requirements.)

Knowledge of print production and obtaining print quotes are, as expected, mentioned in the Graphic Design job adverts. Some Digital Design job adverts also ask for InDesign and print knowledge, which points to a blurring of boundaries and the need for versatility.

Prototyping, visualising and collaboration software stand out as a requirement in the UI/UX space, with Figma standing out as most specific mentions (others are Sympli, Adobe XD, Sketch – see Figure 5). Adobe Creative Suite, Photoshop, Illustrator, and InDesign are also listed as a requirement in the UIUX space and, unexpectedly, also the ability to design for print, social media, web and marketing collateral, with video editing and copywriting as advantage (e.g., UIUX21). The question can be asked if industry is looking for a graphic or digital designer with UX abilities, or a UX designer with broad communication design abilities.

Adobe software	Graphic design	Digital design	UI/UX design
Adobe Creative Suite (as collective)	6	11	9
Photoshop	16	15	3
Illustrator	12	11	3
InDesign	9	9	2
After Effects	2	7	0
Premiere Pro	2	5	0
Markup languages and web			
HTML, CSS, and JavaScript	3	20	7
WordPress (and Elementor)	5	8	3
Dreamweaver	2	2	0
Others mentioned: WebFlow, Mailchimp			
Prototyping and collaboration			
(Proto) Figma	2	2	16
(Proto) Sketch	0	1	8
(Proto) AdobeXD	0	2	3
Others mentioned: Moqup, InVision; Axure; Sympli, Zeplin			
3D and Motion			
Cinema 4D; modelling software Modo & Z-Brush, Maya, Arnold &VRay A and PFtrack & Mocha			

Figure 5: Specific software requirements most mentioned

Industry expectations and requirements

Employers might not know what to call the position or what qualifications the suitable candidates should hold, but they know what they expect the designer to produce and how these outcomes fit their strategies and businesses.

Graphic/Digital design spaces

The data revealed a clear need for conceptually and technically versatile designers who can work 360° across media (print and digital) and different channels (above and below the line). The exhaustive list of design outcomes includes identity design, brochures, flyers, posters, presentations, reports, out-of-home, promotional items, advertising and campaigns, video content, display and exhibition material, packaging and e-mailers.

Design for social media and the web (websites, web banners, landing pages) dominate in both the Graphic and Digital design areas. Logo design and corporate or brand identity are primarily seen in Graphic Design, whereas Motion Design and Animation are mainly required in Digital Design adverts. Many adverts list video and video editing as an advantage. The term multimedia has mostly disappeared, and the terms Visual Design or Communication Design appear less than expected. Designers are required to either be able to work from brief to outcome or deliver parts or assets as part of a team.

Employers not only list the desired design outcomes, but also formulate qualitative expectations about the nature of the design solutions, such as aesthetically and visually appealing, creative, trendy, stunning, innovative, mind-blowing solutions that users will love and that are interesting. DD25 asked for a "digital designer/perfectionist/magician". The potential for award-winning work is also mentioned (DD09).

What became evident is that employers are looking for designers with skillsets or understandings often found in other disciplines such as marketing and branding. One such area is digital marketing and social media, specifically social media planning and strategy, SEO, adwords, and analytics. Some job adverts even require online engagement with customers and stakeholders (DD03, DD08, GD06). Some employers look for designers who can maintain websites and social media platforms.

Knowledge of User Interface (UI) and Interaction design is required in the Digital Design space, and User Experience Design (UX) is occasionally mentioned in both Graphic and Digital Design adverts as a requirement. A few adverts list copywriting skills as an advantage. Videography, Photography and Video Editing are often listed as an advantage, and the ability to work with sound is mentioned occasionally.

UI/UX space

The UI/UX space brings a different dimension and new terminologies that clearly show a shift from the design of tangible outcomes to the design of experiences. In these job adverts, the design of digital products, user interfaces, and user experiences firmly position the user in the centre, and adverts require designers who can produce user flows, user maps, and low and high-fidelity prototypes as design requirements. Teamwork and collaboration are highlighted as important, and user research is starting to feature as a required skill.

Similar to Digital and Graphic Design, a theme started to emerge that describes the expected nature of solutions in the UI/UX space. For example, UIUX17 ask for designers who can produce "Products with purpose and experiences that delight"; who can "Dive into complex design challenges that improve lives over many interfaces". What is valued in the adverts is the experience of use, such as features that are a "breeze to use" (UIUX16). Terms used are user-friendly, cool, sophisticated, original, creative, and simple solutions to complex problems.

Knowledge of Graphic Design is often listed as a requirement or advantage, and some adverts indicate that they need a visualiser or a designer to make mock-ups by Figma in the job title. One advert even

asked for a UI/UX Graphic Designer – indicating the need for an all-rounder. Many UI/UX adverts mention alignment with brand guidelines and a few require UI/UX designers who can do social media posts, digital and print-ready brochures or any other marketing related to print or digital assets (e.g., UIUX20). Skills found in other disciplines, such as Corporate Training and IT/Software Engineering are also mentioned.

A purpose statement in a job ad for a UI/UX designer in the healthcare and insurance sector reveals a shift towards systemic integration – Buchanan's fourth domain (UIUX21):

To ensure that [company name withheld] digital features and channels meet the needs of their intended audiences through design, analysis, evaluation and testing of the user experience. Designs and conducts analysis and evaluations of systems interfaces with clients and staff, to ensure maximum usefulness and satisfaction, to increase productivity and to elevate the overall quality of the product or service.

Collaboration and teamwork with specific stakeholders

Many adverts were specific about who designers should be able to work or collaborate with, and these were combined in a separate theme. A job advert would, for example, list teamwork as a general soft skill or attribute, and then expand later on with more specific requirements. Some comprise collaboration with external stakeholders, suppliers and clients and internal cross-functional teams such as marketing and brand teams, social media teams, developers, engineers, copywriters, managers and sales teams. These requirements were listed most in the UI/UX space. The ability to mentor and coach juniors is mentioned as a leadership requirement, as well as the ability to explain design to others or even be an advocate or ambassador for new fields such as experience design.

Research, review and testing requirements

A subtheme emerged from the data that combines research skills and activities, ways of using data, and testing final solutions. Some are explicit (such as user testing), and others are more implied (for example, troubleshooting). Some of these activities are individual, and some are mentioned as team or collaborative activities.

Examples of research skills before and as part of the design process include requirement and systems analysis, trend analysis (such as social media and design trends) and marketing research, user research (to develop personas and user flows – UIUX19), user testing and concept testing. Iterations and improvements of concepts and designs based on research and stakeholder feedback are mentioned several times in all three design spaces, with a strong need for designers with the ability to listen to feedback.

The research tools and techniques listed include facilitating discovery workshops, in-person ethnography, AB Testing, and using quantitative and qualitative data. Knowledge of POPIA was mentioned once as a requirement. Research is seen as a proactive activity by DD01. UIUX09 and IUUX10 provide two contrasting viewpoints: "rely on user validation rather than your own personal opinions" versus a "heuristic, expert assessment of strategic value, usability, design, and content".

The ability to "review" own and peer work and to compare against best practices and standards also emerged as a recurring theme in the data. In order to be able to review something implies a critical thinking process that includes observational and analytical skills, the ability to draw conclusions based on data and one's own experience and knowledge and the ability to communicate and act on these inferences. The term troubleshooting is also used in the job adverts as a form of reviewing.

Specific testing skills include user testing, usability testing, and the review of analytics and data. Adverts in the UIUX space require tools and software, such as Hotjar Recordings, Optimal Workshop, and Zuko – further extending the already long list of job and technology specifications. UIUX21 ask for a Certified Usability Analyst (CUA),³ the only mention found for some form of certification.

Strategic role of design

A subtheme that can best be described as the strategic alignment and the strategic role of design starts to emerge. The skill mentioned most and notably across all three design spaces is a strategic alignment with Brand Identity/CI/standards. Many of the job adverts also require designers who can meet business/brand/marketing goals. DD04 is looking for a designer who is "business SMART and "Able to think about problems from a business perspective using technical and product input".

Employers look for designers who are sensitive towards their corporate culture, e.g., "We seek out and invest in exceptional individuals who understand and support our core purpose, and whose own values align with" (UIUX21).

Discussion

This paper set out to explore the local communication design industry's nature, needs, and requirements and the analysis of the job adverts produced rich data. The inconsistencies in the job titles seen in this small sample stand out. Richard Buchanan indicated in 2001 that the name of this profession or area of study has changed over the years: it has evolved from Graphic Design, to Visual Communication, to Communication Design (Buchanan 2001, p. 10). Interaction and Experience design were included as pathway possibilities for an expanding discipline (Buchanan 2001).

The industry still uses the older job title of Graphic Designer, with multimedia design hardly ever mentioned. The Digital Design space overlaps to a great extent with those of Graphic Design, with more similarities than differences. The most significant shift observed in these adverts is the shift to User Interaction (UI) and User Experience (UX) Design. This is a shift in focus from how things should be designed to how people interact with design outcomes (García Ferrari 2017), and the job adverts echo requirements for new skill sets, knowledge and tools and abilities.

However, similar to Buchanan's four orders that build on each other, first and second orders of communication and interaction are embedded in designing such experiences, presenting new pathways for traditional graphic and digital designers. An awareness of these overlaps can be observed in the sometimes-odd combinations of job titles in the adverts: a UI/UX Graphic Designer or a Digital Graphic Designer. We are also starting to see knowledge of UX as a requirement for Graphic Designers, pointing to cross-disciplinary influence.

These overlaps and shifts challenge educators: what should be at the core of a future-directed syllabus, and what should these qualifications be called? Educators are, on the other hand, influenced by future thinking design discourse by scholars such as Buchanan (1997; 2001), Garcia Ferrari (2017), Manzini (2015), Sanders (2017). On the other hand, current industry needs need to be considered to ensure our graduates are employable. Is design and design education at a fork in the road (Norman 2017)? The analyses of job adverts show that the industry recognises the impact of technological development and socio-economic shifts on design (García Ferrari 2017) and wants multiskilled and versatile designers who can stay up-to-date and adapt to the latest design trends and technologies.

³ Certification trademarked by hfi.training/sa/certifications/cua

The expectations show a demanding industry that expects graduates to hit the ground running, with requirements that are of unicorn scope.

Salaries and job levels such as junior or senior were not analysed for this paper, however, we could not help but notice the much higher salaries in the UI/UX field. The industry sectors were also excluded since many of the adverts are placed by recruiters with the identity of the employer not provided. Yet it was noticeable how many adverts there are for in-house positions in various sectors such as banking, insurance, retail, manufacturing, and services, with fewer traditional agencies/design studios. Several positions for paid internships were noticed during the search, and some were also included in the sample. Such internships provide young designers with opportunities to gain much-needed experience.

Conclusion

Far more research is needed to understand the design sector better. Sadly, none of the adverts mentioned sustainability, although employers require designers who are professional and ethical practitioners. Cultural sensitivity was also only listed once as a requirement. These findings may indicate a still-developing understanding of the systemic role design can play in shaping environments and places to live, and our graduates could and should play an essential role in bringing these dimensions into the workplace.

The analysis of job adverts in this study contributes a valuable snapshot of a developing and challenging workplace that design educators can use to shape curricula and prepare students for a fast-paced, innovative and dynamic industry so that our students are ready not only for the current workplace and but also for future pathways.

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South African futurism: Students' vision of future aesthetics in fashion design

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Abstract

While considering new pathways in design, we envisioned the futuristic aesthetic of fashion in the South African context. Although fashion designers work with complex and multifaceted problems, the cornerstone of good design remains beautiful aesthetics; thus, when imagining the progression of South African design, we start with an investigation of aesthetics.

No one viewpoint can adequately describe South African aesthetics due to the country's multicultural history and makeup. The question of South African aesthetics is thus best researched from the perspective of multiple participants and how they each view their cultural aesthetic based on their heritage. In a student project, we asked what 'South African Futurism' is to gauge students' viewpoints on the future of South African fashion aesthetics from the student's heritage lens. The term futurism, used in the project, means to 'represent a dynamic vision of the future'.

Students were asked to research their heritage through a collection of visual images to present their idea of futuristic South African aesthetics. Students completed a visual analysis of their research using the following elements of fashion design, identified as the big five elements: shape, proportion, texture, design details, and colour. Students applied their research outcomes to a series of futuristic shirt designs that included a textural application.

From the design outcomes produced by the students, a case study was conducted to observe and describe the five design elements as perceived by the students. This paper will present key insights into the future of South African fashion aesthetics based on how the students reimagined design elements from their heritage to envision futuristic South African fashion.

Keywords: Fashion design aesthetics, heritage, South African futurism, student perspectives.

Introduction

Through a review of literature, we found that fashion identity and culture are often viewed through a Western lens. A substantial number of studies have been conducted on Eurocentric and Anglo-American fashion and dress (Jenss 2016, p. 4). This focus in literature misrepresents Fashion as a Western phenomenon. Furthermore, there has been an emergence of a need for the Africanisation of curriculum to address historical biases within African educational systems (Mugume 2017; Shizha &

Kariwo 2014). Within this context, the need for research that considers fashion identity and culture from an African perspective becomes paramount.

One way in which this gap can be addressed is through the idea of Neo-Africanism. Neo-Africanism within the design field challenges Western design principles by embracing, redefining, and celebrating African identity, culture, aesthetics, and craft practices (Irele 1990; Mitchell 2019; Taye 2021; Yalae 2008). Based on this idea, students were asked to research the aesthetic elements within their own South African heritage and present their vision of futuristic South African fashion by reimagining these aesthetic elements in a design for a shirt.

Before students could research aesthetics within their own cultures, we first had to provide a theoretical basis to define the concept of aesthetics. To this end, theory on the elements and principles of design were used to identify signifiers that could guide students' research on aesthetics and serve as an analysis tool for the findings in this paper. The elements and principles of design used to guide successful aesthetic outcomes in fashion were identified in the literature. These elements are then further narrowed down to five main elements of design emphasised by the institution where the research was conducted, namely colour, shape, proportion, texture, and design details. Students researched their heritage by identifying these elements within their culture to reimagine them in futuristic designs that represent these key aesthetic principles.

A case study was conducted to analyse each element in the students' projects visually and holistically to describe the students' interpretations. These findings were then used as prompts to create an AI-generated image with Midjourney to present what the students' futuristic interpretations could look like and present an imagined futuristic South African garment.

Cultural identity as design inspiration in fashion design

The histories of our respective cultural aesthetics have always been sources of inspiration for fashion designers. The aesthetic elements within cultural traditions help designers develop contemporary adaptations (Faerm 2010, p. 45). However, a need for the Africanisation of fashion curriculum and a view on cultural aesthetics from a Neo-African perspective has developed. As such, an argument has been constructed below through a literature review to identify the need for the findings presented in this paper.

This literature review explores three concepts to contextualise the objective of this study; firstly, it looks broadly at existing textbooks that specifically focus on fashion identity and history from a Western perspective used in fashion design education; secondly, it considers Africanisation of curriculum; and lastly, it focuses on Neo-Africanism in design, as a means of Africanising curriculum.

A reflection on the perspectives in literature concerning fashion identity and history

Fashion design textbooks are valuable resources for understanding the intricate relationship between fashion, identity, and history. While numerous textbooks cover various aspects of fashion design, many specifically cover fashion identity and history from a Western perspective. By reflecting on these resources below, we identify that fashion identity and history within design education are shaped primarily through a Western lens.

Crane (2000) analyses the complex interplay between fashion, identity, and societal structures in the book *Fashion and Its Social Agendas: Class, Gender, and Identity in Clothing*. The textbook discusses how Western fashion choices reflect and shape personal and collective identities. Another widely utilised textbook in fashion design education, published by the Kyoto Costume Institute (2006), titled

Fashion history from the 18th to the 20th century, also offers a detailed examination of fashion's evolution during the Enlightenment, Victorian eras, and beyond. This textbook emphasises the significance of Western fashion trends and how these trends shaped societal norms and individual identity of the times. McDowell (2012) comprehensively explores fashion history from ancient times to the present in the textbook *Fashion: the definitive history of costume and style*. This textbook examines the evolution of Western fashion, highlighting the influences of social, political, and cultural factors on fashion identity during various eras (McDowell 2012). The Fashion Book (Phaidon Press 2013) offers an encyclopaedic overview of fashion, showcasing key designers, iconic garments, and influential trends. This textbook serves as a visual guide to Western fashion by allowing readers to understand its historical development comprehensively. Barnard (2021, p. 3) also compiles various scholarly essays in the textbook *Fashion theory: a reader*, discussing fashion as a cultural and historical phenomenon. This collection of essays explores Western fashion identity in relation to broader sociocultural contexts (Barnard 2021, p. 3).

Many fashion design textbooks focus on fashion identity and history from a Western perspective, and each examines the multifaceted nature of fashion and its impact on cultural identity. Although these textbooks serve as valuable references for fashion design students, in South Africa, examples of textbooks that develop critical thinking around the complex relationship between fashion, identity, and history from an African perspective are limited.

This section has identified that fashion identity and culture in fashion design education are often viewed through a Western lens. The following section will unpack the Africanisation of curriculum, including the African perspective in education.

The necessity of Africanisation of curriculum

In recent decades, the Africanisation of curricula has emerged as a significant discourse in education and aims to address historical biases within African educational systems. Various scholars (Asante 1991; Brock-Utne 2002; Mugume 2017; Sifuna & Otiende 1996; Shizha & Kariwo 2014) have explored the need to incorporate African perspectives, knowledge, values, and experiences into curriculum and pedagogy to foster a more inclusive and culturally relevant educational experience for African students.

Prominent research by Asante (1991, p. 170) titled 'The Afrocentric idea' provides a theoretical framework for incorporating African perspectives into various disciplines. Asante (1991, p. 170) argues that the Africanisation of curriculum promotes a sense of identity and empowerment among African students and challenges dominant Western narratives. Sifuna and Otiende (2006, p. 15) explore the tensions between globalisation and African education, emphasising the possibilities and challenges of Africanising education in the face of global influences. Additionally, Brock-Utne (2002, p. 131) critically examines the impact of globalisation and Western educational policies on African education. The author highlights the importance of African countries reclaiming and reshaping their educational systems according to their cultural contexts and needs.

Authors such as Shizha and Kariwo (2014) and Mugume (2017) also examined the history and challenges of education in specific African countries, focusing on the post-independence period. These authors shed light on the debates surrounding the Africanisation of curriculum and argue that Africanising education can contribute to social transformation, identity development, cultural preservation, and decolonisation in African societies.

The necessity for more research concerned with fashion identity and culture from an African perspective in fashion design education is thus not only based on the lack of available texts but also the importance of this type of research for the transformation and Africanisation of curriculum, as identified in this section. This section highlights the need for more studies to be conducted from an African perspective to bridge the education gap and emphasise the relevance of Africanising the curriculum. The third section of the literature review will focus on Neo-Africanism, specifically in design, as a tool to Africanise curriculum.

Neo-Africanism in design as a means to Africanise curriculum

Neo-Africanism within the design field is a concept that aims to redefine and celebrate African identity, culture, aesthetics, and craft practices (Irele 1990; Mitchell 2019; Taye 2021; Yalae 2008). It seeks to challenge Western design principles' dominance and embrace African traditions' richness and diversity (Mitchell 2019; Taye 2021). Exploring Neo-Africanism in design involves reinterpreting and incorporating traditional African aesthetics into contemporary design (Mitchell 2019). Mitchell (2019) says this involves a deep understanding of indigenous art forms, patterns, symbols, and motifs adapted to modern contexts. The integration of African aesthetics promotes cultural pride and encourages the preservation and revitalisation of traditional design practices (Taye 2021, p. 32).

Neo-Africanism in design represents a movement that celebrates and redefines African cultural identity and aesthetics and challenges the dominance of Western design paradigms (Irele 1990; Mitchell 2019; Taye 2021; Yalae 2008). Africanisation of curriculum can be addressed through Neo-Africanism; incorporating indigenous aesthetics and emphasising local practices makes new perspectives within the design field possible for designers, including South African fashion design students.

A project based on Neo-Africanism was given to students to create a curriculum that contributes to the Africanisation of design education. Students had to research aesthetic elements from their heritage and reimagine them in a shirt design to demonstrate their vision of futuristic South African fashion. Within the growing interest in Neo-Africanism and the context of design, Taye (2021, p. 49) suggests that further research and critical discourse are necessary to refine the theoretical foundations and practical applications of Neo-Africanism, highlighting the importance of projects such as this. More examples are needed of how Neo-Africanism can be practically applied in Fashion education to Africanise curriculum.

Elements and principles of design as signifiers in fashion for fashion identity

To further expand on the theoretical foundation of the students' project, we looked at how the elements and principles of design could be used as signifiers to identify various aesthetic aspects within the students' heritage. These signifiers were used as a guideline for students' research and an analysis tool to develop a description of their work.

The elements and principles of design play a crucial role in determining the success and comprehension of visual design aesthetics across various disciplines and how visual design aesthetics are understood and considered successful. This section will first contextualise the elements and principles of design within art and design to examine the broad context and discuss how they work together. This section will then explore their application in the field of fashion practice. Lastly, it will examine how these elements and principles are applied within the academic institution where the study was conducted.

Design elements and principles in art and design

The earliest artworks on cave walls to the current image-saturated environments have been studied by theorists and artists to establish principles that justify their compositional appeal. These principles are known as design elements (Webb 2010, p. 28). Essentially, the elements of design are the 'raw ingredients' that determine the visual appeal of a design's aesthetics. Therefore, how is design aesthetics understood by the audience it is intended for? Can they visually read the design, positively respond to it or place value on the design viewed (Webb 2010, p. 28)? These design elements can be categorised as follows: line, shape/form, texture, space, motion, value, and colour (Pipes 2003, p. 13).

The application of design principles determines how these elements are combined to create pleasing aesthetics. The design principles represent the elements to achieve a successful design outcome (Webb 2010, p. 70). The principles of designs can be categorised as follows: harmony/unity, balance, scale/proportion, emphasis, rhythm, and pattern/repetition (Pipes 2003, p. 173). While the design's success is often intuitively determined by the designer, applying the design principles often influences the audience's perception of its value (Webb 2010, p. 70). The elements and principles must function together and cannot be applied independently. Therefore, the successful blending, manipulation, and combination of the design elements guided by the principles determine the success of the design outcome.

According to Adams (2013, p. 158), the elements and principles of design form the framework that governs good design, including how the design is created and evaluated and its communicative value. The aesthetic quality of a design comprises two elements: the process and the product. The process involves planning to achieve the intended outcome, while the product refers to the resulting arrangement that encompasses the outcome of the process (Siaw et al. 2014, p. 2).

Design elements and principles in fashion

According to Siaw et al. (2014, p. 2), understanding the elements and principles of design is vital to successful design processes and aesthetically pleasing outcomes in fashion design. The language of clothes and the messages conveyed through our fashion choices reveal a lot about our identity and understanding of what we wear. Ignorance of the design elements and principles within the fashion can make a design look out of place (Siaw et al. 2014, p. 2).

There is a consensus that the design elements and principles within the fashion design discipline are interconnected (Siaw et al. 2014, p. 3). These elements can be categorised as shape, colour, texture, and line (Siaw et al. 2014, p. 3). Form or shape refers to the structure of an item, the shape is 2D, and form being the 3D interpretation, incorporating length, width, and depth (Siaw et al. 2014, p. 3). Line can be identified as a continuous mark made on a surface or refer to the implied line found in the shape and silhouette of a garment (Siaw et al. 2014, p. 3). Line conveys width, length, direction, focus, and feeling and can contribute to conveying a specific mood (Siaw et al. 2014, p. 3). Line can also be part of the fabric as a print, weave, or a design detail such as a yoke or style line (Siaw et al. 2014, p. 3). Colour as a design element is characterised by hue, value, and intensity. It can also convey elements such as warmth and coolness, linking to a garment's overall mood and feel. Texture refers to the drape and feel of fabric, whether stiff or soft, and can be implied or tactile, depending on the fibre construction of the textile.

According to Siaw et al. (2014, p. 3), the principles of design within the fashion discipline are rhythm, emphasis, proportion, balance, and unity. These principles inform how the elements are combined and manipulated. Rhythm can create movement in a design by leading one's eye from one part to another. Rhythm can happen through the repetition of elements such as line or colour. Emphasis is

the principle that draws the viewers' attention to a specific part of the design, whether through colour or detail. Proportion refers to the relationship between the various parts of the design, for example, the size of a collar or pocket, compared to the rest of the garment. It also refers to the proportions of the garments on the body, such as the placement of the hemline and neckline in relation to the body. Balance can be symmetrical or asymmetrical and considers the design, whether the various components work together harmoniously to deliver a pleasing outcome. When harmony or unity is achieved, the design outcome is successful, as all elements and principles look right together. Harmony or unity is difficult to define, as it is a principle and the overall goal of any design.

Design elements and principles applied within the academic institution

Within the academic institution where the study was conducted, the elements and principles of design are taught at a first-year level, informing students' understanding of the foundation of design. The students are introduced to the elements as tools and the principles of the way these tools are used. Five main design elements are emphasised once the students enter their second year of study. While the use of other elements and principles of design are also recognised, these five elements are highlighted as key elements to assist students during their ideation process. These elements, collectively called the "Big 5 Elements", include shape, proportion, texture, colour, and design details.

Although design details are not explicitly classified as elements or principles, they are essential to consider when designing a garment. The details inform the shape and fit of the garment, as well as the functionality and aesthetic success. The way these details are incorporated within the garment is directed by the elements and principles of design.

In conclusion, the elements and principles of design are fundamental in shaping the success and comprehension of visual design outcomes across various disciplines, including fashion design. Within the academic institution where the study was conducted, key elements are identified to guide the design process and are informed by the elements and principles of design. Overall, the "Big 5 Elements" framework is used to govern good design, together with the elements and principles of design that guide applying these elements – playing a crucial role in creating technically sound, functional, and aesthetically pleasing garments.

Research methodology

This paper envisions a futuristic fashion aesthetic in South Africa, as presented in a project completed by students. A group of students was tasked with researching the aesthetics from their cultural heritage based on five elements and principles of design used in fashion: shape, proportion, texture, design details, and colour. The students were then required to reimagine these elements in a futuristic shirt dress design.

These projects were visually analysed and observed to describe the key aesthetic elements as perceived by the students. The key descriptions for each individual design element were then utilised to create visual representations of what each of these elements could look like in a futuristic shirt design. This was accomplished through the use of the AI image generation program Midjourney. As a final step, all of these key elements were then combined and used as prompts to create one final AI-generated image, showcasing the collective visual outcome of all the students' work and presenting a possible futuristic South African aesthetic based on the students' imaginings.

Research approach and methodology

This study employed a qualitative research approach, which seeks to gain insights and understanding from the perspective of the individuals under investigation (Merriam & Tisdell 2016, p. 1). The primary objective of this study was to comprehend how different individuals perceive the aesthetics within their own culture and how they envision these aesthetics in futuristic designs. Given this aim, a qualitative research approach was deemed appropriate as it describes how people interpret and make sense of their world (Babbie 2016, p. 99; Merriam & Tisdell 2016, p. 6).

A case study was conducted to observe and describe the five design elements and principles, as perceived by the students, from the design outcomes they produced. Case studies such as this involve empirical inquiry that relies on direct and indirect observation (Yin 2014 p. 16). A case study is a qualitative approach that allows researchers to examine a phenomenon within a specific context (Muratovski 2016, p. 49). The context of this case is defined by a project that a group of second-year students completed on South African futurism.

A case study approach is most suited to this study, as case studies explore a specific project within a real-life context to holistically describe and capture multiple participants' perspectives and offer a comprehensive understanding of the case (Thomas 2011, p. 3). By focusing on direct observation of the student's project, this case study will provide valuable insights into students' perception of the aesthetics in their heritage and how it can evolve in fashion design.

Qualitative data analysis requires the researcher to combine all the data to derive meaning from it (De Vos et al. 2011, p. 397). Muratovski (2016, p. 53) suggests first interpreting the single instances to compare and synthesise the findings to identify commonalities. This approach was followed to analyse this case study. First, the students' projects were grouped according to their cultural backgrounds, and then each individual project within the group was analysed. The projects within each group were then considered collectively to identify the aesthetic elements and principles within each culture. Lastly, all the findings were compared to develop a holistic description of the aesthetic elements identified in the students' projects. This analysis demonstrated how students perceive aesthetics within their respective cultures and how they envision them in the future.

Lastly, the image generator program Midjourney was utilised to develop images that visually represent the findings. The key findings in each of the aesthetic elements or principles, namely shape, colour, proportion, texture, and design details, were used as prompts to create images in Midjourney to firstly demonstrate each individual design element, and secondly the collective visual outcome of the case, representing students' vision of future aesthetics in Fashion Design.

Ethics

The institution where the study was completed advised that this is a negligible low-risk study as none of the participants was directly involved in the data collection process. Because the data was observed from work already completed by students, no further permission was required from the institution or students to complete the study.

Discussion of results

Due to South Africa's multicultural history, the country has a diverse makeup, and no single perspective can fully capture the essence of South African aesthetics. Therefore, the study considered the viewpoints of multiple participants, each reflecting on their own culture's heritage and aesthetics. The participant group was selected from two second-year fashion classes. Only students whose work

was complete and completed according to the assignment’s instructions were selected for the study. The participant group consisted of nine Afrikaans students, five Zulu students, three isiXhosa students, two Sotho students, two Jewish students, one Venda student, one Cape Malay student, one Ndebele student, and one Islamic student, clearly demonstrating the diversity of cultures found in South Africa. In classifying their culture, students were allowed to choose the criteria that resonated most with them. Students opted to define their culture based on one of two primary factors: their language or religion.

It is important to note that this research does not accurately generalise cultural aesthetics. As a single case, it solely represents the viewpoints of the students whose work was observed. Furthermore, it is essential to note that the views expressed in this research reflect the personal interpretations and perspectives of the students regarding their own culture. The primary objective of this study was not to develop precise descriptions of aesthetics within South African cultures and their future adaptations. Instead, the aim was to present a futuristic South African design based on students’ interpretation of South African aesthetics.

A holistic description of the results according to the elements and principles of design

While considering new pathways in design, we envisioned the futuristic aesthetic of fashion in the South African context. As highlighted in the literature review, aesthetics in fashion were identified in this project through the five elements and principles of shape, proportion, texture, design details, and colour. Each element has been holistically considered and described across all cultures to identify the most relevant aesthetics for a South African context. The main descriptions that emerged for each design element were then input into the image generation AI program Midjourney. This was done to generate visual representations that could suggest what the aesthetics of a futuristic South African shirt design might look like.

Shape

The Afrikaans, Zulu, Ndebele, Cape Malay, and Islamic students described the shapes in their research as simultaneously structured and rounded. In their heritage research, the Afrikaans students described the shapes as a combination of structured forms, including rectangular, square, and trapezium shapes, and organic rounded shapes, such as circular and hourglass silhouettes. In the Zulu students’ research, garment shapes are simultaneously structured with rectangular, triangular, and square shapes and rounded through the cocoon and oval shapes. The most common shapes found in the students’ research are a combination of structural shapes such as rectangular, triangular, and trapezium shapes combined with organic rounded shapes featuring circular and hourglass silhouettes. The structural shapes are most often featured in the top part of the garment, while the circular shapes dominate in the bottom part of the garment.

Shape summary as AI prompt	
A shirt dress with a combination of structural shapes such as rectangular, triangular, and trapezium shapes combined with organic rounded shapes featuring circular, hourglass silhouettes. The structural shapes are featured in the top part of the garment, while the circular shapes dominate in the bottom part of the garment.	
Key descriptors_structured shapes	AI-generated visual representation
Rectangular	
Square	
Trapezium	


Key descriptors_ rounded shapes	
Organic	
Hourglass	
Oval	
Cocoon	
Circular	

Figure 1: Developed by Stability.ai 2023, a futuristic vision garment shape

Proportion

The Zulu, Ndebele, and Jewish students' designs mainly featured loose proportions that hang away from the body in the top half of the garment. However, as the other cultural groups presented, the most prominent proportions are a fitted top with a flared bottom and volume in the sleeves, which are either rounded or flared. The top part of the garment occupies one-third of the body, while the bottom occupies the remaining two-thirds. These proportions were especially prominent in the work of the Afrikaans students. In these students' projects, the divisions were often accompanied by high necklines reminiscent of garments in the Victorian era. These proportions were also repeated in these students' futuristic designs, suggesting that they are considered key features in Afrikaans cultural aesthetics by the students.


Proportion summary as AI prompt	
A shirt dress with a fitted top and a flared bottom. Voluminous sleeves are either rounded at the top and flared at the bottom. The top part of the garment occupies one-third of the body, while the bottom occupies the remaining two-thirds.	
Key descriptors_figure proportions	AI-generated visual representation
Fitted top	
Flared bottom	
Top occupies one third of the body	
Key descriptors_sleeve proportions	
Voluminous proportions	
Flare	
Round silhouette	

Figure 2: Developed by Stability.ai 2023, a futuristic vision garment proportion

Colour

The colours described by the students were primarily based on decorative details found in their respective cultures. In their heritage research, the Zulu students presented two prominent colour palettes. The first consisted of brown, black, white, and beige, based on animal hides included as a textural design detail. The second palette included primary colours such as blue, white, and red, derived from design details such as geometric prints and beading.

For the isiXhosa students, white, black, and orange were the three most noticeable colours featured in their historical and futuristic designs. The Venda student also presented a combination of neutrals and brighter colours, with a colour palette consisting of white and beige, accentuated by touches of orange, green, blue, yellow, and purple in the futuristic designs.

Combining neutrals with brighter colours is a common theme in most students' work. We can conclude that the Ndebele, Sotho, Cape Malay, and Islamic students' work also featured neutral colours, such as white, black, and brown, complemented by brighter colours, including yellow, red, blue, green, orange, and pink. The two Jewish students, however, had a unique colour palette consisting of neutral colours combined with maroon, bright blue, dark blue, beige, grey, and gold accents.

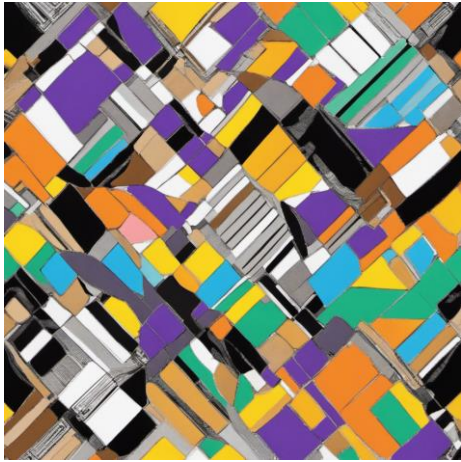
Colour summary as AI prompt	
Shirt dress with a neutral colour palette such as white, black, and brown. Decorative and geometric details in the shirt feature bright colours such as yellow, purple, blue, green, orange and pink.	
Key descriptors_neutral colour palette	AI-generated visual representation
White	
Black	
Brown	
key descriptors_bright colours	
Yellow	
Purple	
Blue	
Green	
Orange	
Pink	

Figure 3: Developed by Stability.ai 2023, a futuristic vision garment colours

Texture

In the project, students were asked to apply their research to a shirt dress design, meaning that most garments were made from smooth cotton shirting fabric. However, many of the garments incorporated implied texture through prints. Geometric prints were presented by the Zulu, isiXhosa, Venda, and Ndebele students. The Sotho, Venda, and Jewish students also used traditional prints to imply texture. An especially interesting element was an Arabic calligraphy print created by the Islamic student. Textural details were further enhanced through beading and embroidery and the inclusion of blankets by the Sotho and Ndebele students.


Texture summary as AI prompt	
Shirt dress with implied texture through South African geometric print. Textural elements through African beading	
Key descriptors_implied texture	AI-generated visual representation
Geometric prints	
Key descriptors_textural elements	
South African beading	
South African embroidery	

Figure 4: Developed by Stability.ai 2023, a futuristic vision garment textures

Design details

There was a wide variation of design details across the projects. As the task was to design shirt dresses, many typical shirt elements were observed in the students' work, such as cuffs, collars, button stands, pleats, gathers, ruffles, panelling, and pockets. These elements are not necessarily culturally specific but are commonly used in shirt designs worldwide. Culturally specific design details were primarily expressed through the various print designs mentioned in the previous paragraph. The use of beading and geometric shapes was evident in the heritage references and futuristic designs of the Zulu students, suggesting that these elements are considered key factors representative of Zulu culture.

Some culturally unique design details included the Islamic Hijab, isiXhosa draped headcloths, and the use of leopard skin by the Zulu students. According to one of the participants, "Xhosa people have a close relationship with cloth and beads [...] as fabric trims and finishes convey messages", which is evident in the isiXhosa students' projects, where geometric shapes created through beading or prints are prominent features. Additionally, the inclusion of embroidery as a decorative detail in the futuristic designs of the Afrikaans and Ndebele students was observed.


Garment details summary as AI prompt	
Shirt dress with cuffs, collars, button stands, pleats, gathers, ruffles, panelling, and pockets. The shirt dress must include South African geometric shape print, South African beading and South African embroidery details.	
Key descriptors_shirt elements	AI-generated visual representation
Cuffs	
Collars	
Button stand	
Pleats	
Gathers	
Ruffles	
Panelling	
Pockets	
Key descriptors_decorative elements	
South African beading	
South African embroidery	
Geometric prints	

Figure 5: Developed by Firefly 2023, a futuristic vision garment design details

Conclusion

This paper aimed to gauge students' perceptions of the future of South African fashion aesthetics based on their cultural heritage. The diversity of cultures that made up the participant group (Afrikaans, Zulu students, isiXhosa, Sotho, Jewish, Venda Cape Malay, Ndebele, and Islamic) demonstrates the complexity of cultural research in South Africa, as multiple viewpoints need to be considered. Despite the various cultural backgrounds that were used as inspiration for the student projects, their design outcomes had many similar aesthetic elements. However, further studies must be conducted to unpack the reason behind these similarities. The purpose of this study was only to identify the aesthetic elements from students' work that could inform a vision of what futuristic aesthetics could look like in South Africa.

To develop a vision of futuristic aesthetics in South Africa, a way had to be found to present the findings visually and collectively. In order to do this, an AI-generated image was produced, as seen in Figure 1 below, to represent the collective interpretation and analysis of students' work. Keywords from each of the five design elements and principles were identified. These keywords were then woven together to create a prompt for input into a generative AI imaging tool, Midjourney. The prompt used: *contemporary fashion featuring fitted top proportions with structured shapes and exaggerated sleeves, and bottom proportions with flared shapes, including accent colours of yellow, red, blue, green, orange, and pink, with textures of embroidery, beading, and geometric print*, produced impactfully, and original designs that visually describe a possible futuristic perspective of a diverse, multicultural, South African aesthetic.



Figure 6: Developed by Midjourney 2023, a futuristic vision of South African fashion aesthetics

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SESSION 2: Connecting





Vulindlela – making new pathways

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Buna Africa: The participatory design of an online aquaculture platform

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Abstract

Aquaculture has become the fastest-growing animal production sector globally, with production in Africa especially, steadily increasing. The move from subsistence to commercial fish farming requires emerging farmers to access technical information and support services. In order to address this need, the Rural Fisheries Programme, a developmental unit with the Department of Ichthyology and Fisheries Science at Rhodes University, South Africa, developed Buna Africa. Buna Africa is an online platform intended to support the development and management of the aquaculture sector by providing fish farmers with technical support and services to assist them in increasing production and becoming more efficient and secondly, providing governments with a means to track production data in their area, and to use this data to inform policy and management decisions. Buna is currently being piloted in Zambia and Malawi. During this process, it was recognised that the design of the platform needed to allow greater access to, and understanding of the content, to enable farmers with low literacy, or limited experience with digital platforms to make optimum use of the platform. For this reason, an interinstitutional and interdisciplinary project was embarked on to address both user interface design and scientific information of the platform, with members from Ichthyology and Fisheries Science at Rhodes University, Graphic Design at the University of Johannesburg and Information Design at the University of Pretoria. The research is framed using the following questions: What are the current user and stakeholder perceptions of the Buna platform in terms of ease of use, accessibility and understandability, what type of online formats are required to allow easy access to the Buna platform, and lastly, how can the design of the Buna platform allow for easier access, engagement and understanding its content? Literature reveals that designing for users with low literacy is a balancing act between designing for their needs, without alienating more technologically skilled individuals. Participatory design methodologies are as such recommended as being an effective means of creating digital solutions. Fish farmers from the Vhembe district in Limpopo were purposively sampled for the project, as they had been part of the initial development of the Buna platform. Spinuzzi's (2005) participation design phases were used to collectively formulate the Design Brief for the Buna platform with the fish farmers, to analyse the website and create prototypes and to then collect feedback on the implemented changes. Engagement with the farmers was positive, and valuable, context relevant feedback was received on how the Buna platform functions, and more importantly, how farmers envisage themselves engaging with it. Findings emphasised that access to

information, and the ability to create a community of practice were the most valuable aspects of the platform. More broadly, the paper speaks to how participatory design can be viewed as a strengths-based and proactive way to engage with, and involve local communities in the development of systems that will allow them to actively participate in the Fourth Industrial Revolution.

Keywords: 4IR, aquaculture, design for social change, participation design.

Introduction and background

According to the Food and Agriculture Organization of the United Nations (FAO 2023), aquaculture is the fastest-growing animal production sector. This sector is expected to continue expanding as demand for fish increases. Aquaculture production is not distributed equally across the globe. The FAO (2022, p. 8) reported that in 2020, Asia accounted for 70% of all global fisheries and aquaculture production. Africa, on the other hand, only accounted for 7%, despite the continent's favourable conditions.

A significant factor in this disparity in production between Africa and Asia could be attributed to the technical capacity of fish farmers (Rouhani & Britz 2004). Aquaculture is a technical activity, and for farmers to be successful in it, they need to be sufficiently skilled and capacitated. The Agricultural Sector Education Training Authority (AgriSETA) 2021 report outlines a skills plan for the Aquaculture sub-sector in 2020-2021. It highlights significant challenges faced by the aquaculture sector, including unsupportive regulations, limited land access, skill shortages, financial barriers, fragmented marketing, and competition from cheap fish imports (AgriSETA 2021, p. iv). These obstacles hinder the subsector's growth. The report emphasises the importance of training to address these issues by identifying scarce skills, closing training gaps, and building the capacity of aquaculture workers. This capacity-building effort aims to unlock the sector's potential, create jobs, and enhance support services (AgriSETA 2021, p. vi).

In order to assist South African fish farmers (and government extension officers¹) to develop their technical skills, in 2010 Rhodes University developed a technical manual for fish farmers (Rouhani & Vine 2010).²

In 2021, Rhodes University completed a three-year project³ to convert the aforementioned manual into an online platform called Buna Africa. The objective was to design an online platform that attempts to solve two key challenges facing the aquaculture sector, namely:

- Fish farmers need access to technical information and support services to enable them to not only increase production but also become more efficient and financially secure.
- Government Departments mandated to oversee the aquaculture sector do not have systems in place that enables farm production data to reach them. Without this data, governments are unable to develop effective aquaculture policy or to manage and develop the sector.

In developing Buna, fish farmers in the Vhembe district of Limpopo Province were engaged through the Provincial Department of Agriculture. Their feedback, along with insights from government

¹ An extension officer is a government official who provides technical support and services to fish farmers. These services are generally related to animal husbandry and production.

² Funded by the Water Research Commission (WRC).

³ Funded by the WRC.

aquaculture extension officers, influenced the initial design and functionality of the platform. By March 2021, Buna was fully functional, and was being piloted in Malawi and Zambia.

However, Buna Africa expanded beyond being a mere online manual for fish farmers. Various additional features were incorporated to enhance its benefits. The manual was condensed and included hyperlinks for easier information retrieval. Each chapter was accompanied by relevant YouTube video links, allowing farmers to access technical information from different regions, such as a tilapia spawning video from Ghana. A directory of suppliers, including feed manufacturers and fingerling producers, was included. Additionally, a real-time messaging system similar to WhatsApp was integrated, enabling farmers to connect and communicate with each other, as well as extension officers, through the platform. The addition of a "calculator" function allowed farmers to calculate pond area, the size of their fish without weighing all the fish in a pond, compare fish age and weight to ideal conditions, and determine appropriate feeding amounts. These features and more empowered fish farmers to make informed decisions.

Furthermore, farmers can submit their production data through Buna Africa, which is then shared with government officials. This feature fulfils the crucial requirement of providing data to government officials⁴ responsible for policy and decision-making in the sector.

Problem identification

There has been a global effort to incorporate fish farmers into the Fourth Industrial Revolution (4IR). In countries like India, numerous dedicated apps have been developed for fish farmers and fishers, with over 30 such apps already available (Dhenuvakonda & Sharma 2020). Buna Africa aims to fulfil a similar role on the African continent. As noted earlier, the focus on skills development in this sector, as highlighted AgriSETA (2019, p. 17), emphasises the importance of providing training to existing small-scale farmers to enhance their understanding of fish biology. This training aims to improve the productivity and profitability of their businesses. In order to avoid complications resulting from unsound advice, agriculture extension officers must possess adequate knowledge of aqua farming, as they often serve as the primary point of contact for freshwater farmers who have limited resources (AgriSETA 2019, p. 17). Many fish farmers reside in under-resourced rural areas. Access to knowledge and information is crucial for empowering such communities (Rahman & Fukuda 2015, p. 126). AgriSETA (2019, p. 17) emphasises the significance of getting the basics right in pond farming to avoid being stuck in a cycle of low productivity.

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), literacy extends beyond traditional skills like reading and writing. It is now viewed as a means of identification, understanding, interpretation, creation, and communication in a digitally driven and information-rich world (Khuluvhe 2021, p. 3). In South Africa, computer literacy has been recognised and promoted as a form of literacy since at least 2014 (Walton 2014, p. 108). Additionally, the use of multimodal ensembles, such as smartphones, is becoming more prevalent in everyday digital communication (Taylor 2023).

Recognising the need for improved access and comprehension of Buna's content among farmers with low literacy and limited digital platform experience, an interdisciplinary project was initiated. This project involved collaboration between Ichthyology and Fisheries Science at Rhodes University,

⁴ Buna Africa complies with POPIA requirements by explaining to users how their information is used and who has access to it. Additionally, some information is anonymised before it is made available to government officials. The use of the platform is voluntary, and farmers can unsubscribe at any stage.

Graphic Design at University of Johannesburg, and Information Design at University of Pretoria. The primary objective was to enhance both the user interface design and scientific information of the platform.

User Interface (UI) design involves creating visual and interactive elements in software or digital platforms to enhance user experience and usability. It aims to develop an interface that is visually appealing, intuitive, and promotes efficient user interaction. Key considerations in UI design include user-friendliness, clear information presentation, consistency in design elements, and responsiveness to user actions (Interaction Design Foundation 2023).

The case study research as such aimed to explore the following aspects of the Buna platform:

1. *User and stakeholder perceptions*: Assessing the current perceptions of Buna in terms of its ease of use, accessibility, and understandability.
2. *Required formats*: Identifying the necessary formats that would enable easy access to the Buna platform.
3. *Design improvements*: Investigating how the User Interface of Buna can be enhanced to facilitate easier access, engagement, and understanding of its content.

Literature reveals that designing for users with low literacy is a balancing act between designing for their needs, without alienating more technologically skilled individuals. Participatory design methodologies are as such recommended as being an effective means of designing digital solutions.

More broadly, we were interested in how participatory design can be viewed as a strengths-based and proactive way to engage with and involve local communities in the development of systems that will allow them to actively participate in 4IR using this case study.

Literature

Designing for users with low literacy

Though extensive insights and recommendations on designing digital artefacts for users with low literacy exist, there are fewer resources that offer examples of user participation in the development of such digital artefacts. Jones et al. (2017, p. 169) argue that although research has predominantly focused on how to improve emerging users' lives,

It is now time to engage with such users so that they can help sketch out a longer-term technology road-map that will lead to devices and services which will be of value 5 to 10 years from now.

In *Actionable UI Design Guidelines for Smartphone Applications Inclusive of Low-Literate Users*, Srivastava et al. (2021, p. 136, 3) propose the use of their Smartphone Applications embracing Low-literate users (SARAL) framework as not only a means to develop, but to analyse applications for low-literate users. The authors conducted a "systematic literature review (SLR) of user interface (UI) design studies with and for the low-literate population" (Srivastava et al. 2021, pp. 136-134), from which 53 relevant papers were used to derive a framework containing 13 guidelines, their actionable definitions, and examples, categorised within five themes. While Buna is not currently available as a smartphone application,⁵ it still needs to be responsive to smartphone use, making the guidelines provided relevant to its redesign. UNESCO's report, *A Landscape Review: Digital Inclusion for Low-*

⁵ A mobile website ensures compatibility with any smartphone and eliminates the need for frequent updates, regardless of the operating system.

skilled and Low-literate People (Zelezny-Gree et al. 2018, p. 8) addresses how technology can be “designed to be more inclusive, accessible and usable for people with low levels of skills”, and similarly provides actionable guidelines that can be considered by UI designers.

Design guidelines generally include actionable advice on language, images, icons, and colour use in human-computer interactions, as well as cultural considerations – focusing on the creation of culturally relevant and responsive design (c.f. Chaudry et al. 2012; Cremers et al. 2008, 2017; Jones et al. 2017; Medhi et al. 2006; Medhi et al. 2011; Medhi Thies 2015; Rahman & Fukuda 2015; Srivastava et al. 2021; Summers et al. 2007; Summers & Summers 2005; Walton et al. 2002; Zelezny-Gree et al. 2018).

Raza et al. (in Zelezny-Gree et al. 2018, p. 40) specifically note that “integrating social elements to the user experience for technologies used by low literate and low-skilled people bolsters the spread and adoption of these technologies”. Jones et al.’s (2017) research indicated a shift in focus from the individual mobile user, noting that participating “emergent” users were instead interested in using devices and software to learn about other people, rather than focusing on the self. Robinson et al. (2014) express concerns about the prevailing trend in mobile design that promotes what they refer to as “heads-down thinking”, wherein mobile apps discourage engagement with the physical world. They assert that mobile app designers have room for improvement in terms of considering the needs and experiences of actual users in their designs, as well as enabling them to engage with the external world. Both cultural relevance and the participative design processes are evident in *The talking book: participatory design of an icon-based user interface for rural people with low literacy* by Andrew et al. (2018). The authors explained how certain “navigation” UI icons, such as arrows, were confusing for users, who suggested icons that were relevant to their immediate surroundings.

Walton et al. (2002, p. 530) emphasise that despite the existence of guidelines, addressing the challenges of communicating across cultural and literacy boundaries requires more than superficial visual changes. This challenge is further magnified by the cultural diversity in South Africa and the African continent. They argue that achieving true cross-cultural design or internationalisation is highly challenging, and even designing inclusively for a South African audience is a formidable task. Nevertheless, they emphasise the importance of continuing to explore effective communication methods tailored to specific audiences (Walton et al. 2002, p. 531).

Participation design

Spinuzzi (2005, p. 164) writes on PD as a research method, stating that “[a]s the name implies, the approach is just as much about design – producing artefacts, systems, work organisations, and practical or tacit knowledge – as it is about research. In this methodology, design is research”. Van der Velden and Mörtberg (2014, p. 1) note that PD is a “value-centred design approach” pledged to the mutual and democratic formation of a better future for all involved. PD methodologies are as such recommended as being an effective means of creating digital solutions. Brandt et al. (2013, p. 146) note that PD is not “one approach but a proliferating family of design practices that hosts many design agendas and comes with a varied set of toolboxes”. Sabiescu and Memarovic (2013, p. 615) state that,

Design aims to produce useful artefacts for a certain class or community of users, usefulness that can be determined only in direct relation to the user activities that the artefact will support. Effective design needs to build on a thorough understanding of the user activities that its outcome will serve. In PD, this understanding is advanced by enabling users’ direct participation in design activities.

Workshops, drama, storytelling, and design games serve as methods that foster dialogue, negotiation, and the emergence of novel ideas, challenging assumptions among both users, designers and developers (Sabiescu & Memarovic 2013, p. 613). Genuine participation should, however, include the user as a legitimate partner in the design process, rather than simply acknowledging their input as informants (Robertson & Simonsen 2013). This method provides opportunities for users and designers to workshop solutions together. As such, PD tends to be quite flexible.

The Interaction Design Foundation (2023) describes the key aspects of participatory design as inclusion, collaboration, empowerment, iteration, contextual understanding, and user advocacy.

Methodology

This qualitative research took the form of a case study, working with purposively sampled group of farmers that represent the population of the study – fish farmers in Africa. Fish farmers from the Thohoyandou region were purposively sampled for the project as they had been part of the initial development of the Buna platform (WRC research project 2018 to 2021). By working with the same group of farmers, a level of continuity in the development of the platform is provided. Ethical clearance for the project was granted by the [Institution name].⁶ All participants were asked to sign informed consent forms before taking part in the project. Workshop data was transcribed and coded to protect the identities of participants.

Spinuzzi's (2005, p. 167) participation design stages, namely, the initial exploration of work, the discovery process and prototyping, were used to collectively formulate the design brief for the Buna platform with the fish farmers, to analyse the website and create prototypes and to then collect feedback on the implemented changes. Used iteratively, these provided us with what Spinuzzi (2005, p. 167) describes as "iterative co-exploration by users and designers". Each stage is briefly discussed below.

Initial exploration of work

Spinuzzi (2005, p. 167) describes the first stage of the Participatory Design (PD) process as involving ethnographic methods like observations, interviews, walkthroughs, and artefact examinations. In June 2022, the Department of Agriculture organised a meeting at a participating farmer's homestead, which served as a reintroduction to the Buna platform for farmers and extension officers, as well as an introduction to new members of the research team. The session began with an explanation of project roles and research objectives.

During the meeting, which took the form of a focus group, farmers were asked about their access to online resources, internet availability, data accessibility, and device preferences. Using laptops, the research team demonstrated each page of the Buna platform, explaining its purpose and demonstrating how it can be used. A focus group discussion followed, where farmers shared their initial perceptions of the platform's usability and understandability. They provided feedback on page contents, layout, use of text and images, colour, and how they perceived its relevance to their daily farming practices. Farmers were also asked to identify aspects they liked, disliked, found distracting, or felt could be improved.

In addition, the research team conducted visits to five farms to observe the farmers' work, assess the size of their ponds, and evaluate the existing internet infrastructure on the farms.

⁶ Ethics clearance number [Insert after review].

Discovery

During the discovery phase of the project, the desired outcome was established through agreement with users and stakeholders (Spinuzzi 2005, p. 167). The goal was to update the design of Buna to be mobile-friendly and accessible to users with varying levels of literacy, both in traditional and digital sense, to improve their businesses and foster a sense of community. Building upon the outcomes of the initial workshop, the design team made progress in rethinking the platform's design.

Based on insights from literature and our interactions with farmers during farm visits, three user personas were created as representations of potential Buna users. The website was analysed accordingly, and suggestions were made for rough prototyping. A preliminary style guide was developed to establish a consistent brand identity that can be recognised and trusted across all platforms. For initial, low-fidelity prototypes, we focused on the general layout, home page, and registration process.

Through coordination with extension officers, we arranged a second meeting with the farmers, with 12 attendees present. Farmers split into two groups, considering the group size and time constraints. During this focus group, a walkthrough Buna was done, and farmers were presented with the original digital platform, as well as printed versions of the low-fidelity prototype. The comparison enabled feedback to be gathered on their perception of the design team's suggestions and using the two versions of the platform to complete tasks, aiming to understand their preferred functionalities and assess the usability of the tools. Farmers were invited to actively participate by entering their own information into the system, navigating the platform, and providing feedback through various means such as pointing at screens, prototype printouts, or writing and drawing on paper. Discussions centred around involving farmers in decisions related to information design on the website, including icons, article formats, video links, and other aspects, with the aim of envisioning a solution that meets their specific needs.

Prototyping

Spinuzzi (2005, p. 167) describes stage three, prototyping, as the iterative process of shaping technological artefacts to align with the envisioned workplace from stage two.

Building upon the outcomes of stages one and two, a rough redesign of the website, referred to as Buna 2, was created. During the prototyping stage, farmers had the opportunity to witness the implementation of suggestions from the previous phase in the updated design of the platform, including its mobile responsiveness.

To facilitate feedback, two computers were available for demonstration purposes, while paper printouts allowed farmers to provide input through writing, drawing, or using Post-it notes. The session encouraged farmers to comment on the design, functionality, and navigation of the website. Farmers were asked to identify how they would navigate to specific areas and provide insights on visual design, ease of use, functionality, and content suggestions for Buna.

Iteration is an essential aspect emphasised by Spinuzzi (2005, p. 167), and the three stages should be repeated multiple times. Currently, the design team is incorporating the feedback received and will meet with the farmers again later in 2023 to discuss the implemented changes and progress towards a final design solution.

Results

The design process is iterative, involving continuous feedback and refinement. Instead of presenting the findings chronologically, we condensed them into key themes that emerged during the PD process. "Buna1" refers to the initial platform before any design changes were made, while "Buna2" represents the updated digital design prototype based on the participative process.

Engagement with the farmers yielded positive and valuable results. We received contextually relevant feedback on the functionality of the Buna platform and, more importantly, gained insights into how farmers envision their engagement with it.

Initial perceptions of the Buna platform

Farmers highlighted the need for guidance on accessing Buna from their mobile devices, as the platform was not mobile-responsive. Since all participants used their mobile phones to access the internet and preferred this method, prioritising mobile design was crucial. None of the farmers owned a laptop or had access to facilities like libraries or community centres for internet access. Limited farmers had Wi-Fi at home, relying instead on purchasing data for their mobile devices. Government-provided Wi-Fi hotspots were not available in the area, leading to concerns among farmers regarding data usage and the associated financial implications. While cell phone signal was generally good on the farms, feedback emphasised the importance of considering the costs of mobile data.

Farmers' feedback on Buna's features, including document and video resources, calculator tools, and supplier information, provided valuable insights. They found the platform beneficial for accessing technical information, educating new farmers, and supporting business development. The calculator tools, enabling calculations for fishpond size, average fish weight, and feeding quantities, were particularly well received. However, discussions indicated a need for simplifying the tool based on farmers' feedback. Building a fish farming community through the platform was consistently emphasised throughout the project. Feedback regarding Buna's features, including video resources, calculator tools, supplier information, and chat functions, emphasised the farmers' appreciation for the sense of connection and community that these tools provided.

Barriers to engagement

Barriers to engagement became evident primarily during stages two and three, when farmers interacted with prototypes. Discussions revolved around challenges arising from the rural context, technical engagement, and language usage.

Contextual

During the discussion of the registration process and examination of low-fidelity paper prototypes, it became apparent that providing an address posed challenges. Some farms lacked a street name, while others were uncertain about their stand number or how to format their address. In order to address this, it was agreed that an option should be included for indicating that the address is unknown. This would allow extension officers to contact the farmer, arrange a meeting, and assist in establishing the correct address.

Technical

Buna offers information resources in the form of documents and videos, providing guidance on fish farming. While the content was considered useful, some farmers felt it involved excessive reading or contained information not relevant to their specific circumstances (such as content pertaining to fish farming in other countries). They also expressed concerns about the complexity and heavy use of

technical language in the content, making it difficult to interpret or apply certain documents (such as the water quality table available as an Excel file).

The farmers thought that the use of mathematical terms in the calculator tools may pose a challenge. Some farmers expressed doubts about assuming terms like "subsample" would be understood. It was acknowledged that not all farmers had access to equipment like nets or weighing scales, relying instead on readily available items such as buckets. Farmers pointed out that they typically measured fish food with a scoop, rather than weighing it. One suggestion was to use an easily accessible, standardised measurement, such as a 300ml cold drink tin, to determine how much food should be given. Farmers also recommended the inclusion of an instructional video combining visuals and audio to explain the required information and inputs for using the calculator functions effectively.

The feedback emphasised the need for the resources on the platform to be easy to understand and context relevant. Video was the preferred format of information dissemination, both in terms of technical information and providing clarity on how the Buna platform worked.

Language

Farmers found the content of Buna to be text-heavy, and while they recognised English as the language of business and access, they believed that certain content required multilingual support and could benefit from voiceovers. Consequently, Venda audio feedback, reflecting the primary language spoken by the participating farmers, was incorporated into Buna2 for selected menu items and functions. Farmers found the Venda voiceovers useful and clarifying during their interaction with Buna2. However, further discussion raised concerns that location-specific voiceovers might exclude farmers who relocate to the Limpopo area for business. Inclusion was a vital aspect for the farmers, leading to a suggestion to include English voiceovers alongside multilingual support options. As Buna will be available in South Africa, which has 11 official languages, as well as Malawi and Zambia, implementing multilingual support will require careful planning.

The use of aquaculture business jargon posed a barrier for farmers, as they were unfamiliar with terms such as 'commercial' and 'extensive' operation types. They also questioned why 'subsistence' or 'small-scale' options were not included. Two fish farmers expressed the perception that the classification of operations was a way to encourage farmers to expand their businesses to the "next level". An explanation is necessary to guide farmers in selecting the appropriate operation type, which may also need to be tailored to specific countries, as what is considered commercial in South Africa might be considered small-scale in Zambia or Malawi.

Visual design

We received less feedback on design elements than we had hoped – with farmers focusing extensively on the content and functionality of the platform. Farmers preferred the clean, one-column design of Buna2, which had minimal text compared to the text-heavy two-column design of Buna1. The mobile version of the platform was also well received. Feedback on the updated images used on the platform generated varied opinions. While some participants felt that a visually appealing image created interest in the platform itself, with one farmer remarking on the hard work that farmers do, others suggested replacing the image with a picture of two men working to better demonstrate this, as the prototype showed people walking on a fish farm.

Following feedback from the initial workshop, graphic cues, such as country flags next to country dialling codes, were incorporated into the registration process. This change was well-received and sparked discussions on additional opportunities for integrating graphics into the platform. Suggestions

included the use of infographics or instructional illustrations to enhance user experience and understanding. Farmers discussed a few options for more relevant icons. Suggesting a cup with pellets for the feeding calculator spoke directly to the methods farmers used to feed their fish, whereas farmers emphasised the need for the pond calculator to indicate that a pond is rectangular – something that is standard practice among this group of farmers. Finally, farmers emphasised the need for visual feedback when they completed tasks, such as successfully capturing production data.

Customisation

Farmers were interested in customising their Buna profile by adding profile photos and creating and uploading their own video content and tutorials to share with other farmers. This was linked to conversations about the platform to include location-specific content. The video library is currently predominantly populated with existing video content from other regions of Africa, such as Ghana. Farmers felt they would connect better to the farming practice in videos created specifically for their location.

Discussion

Significant changes have already been made to Buna based on the interactions with the farmers. However, this development is ongoing, and this paper can only report on a small part of the process. Our next engagement session and further user testing will steer us to a final design solution. Concluding discussions following the prototype stage of Buna2 reiterated the usefulness of the platform for farmer's daily business. Features and functions were reviewed multiple times, with participants providing inventive ideas concerning these.

Strengths of the participative process were evident in how tacit knowledge from the farmers could be used to inform the design and development of the platform. Understanding how farmers work, and how they imagine incorporating the platform into their daily lives has provided insight into how tools need to be presented for maximum accessibility. This was particularly evident when looking at the calculator tool, where feedback indicated the need to consider alternatives to the traditional science of measuring and weighing by imaging innovative, affordable, easy-to-access materials in combination with multimodal methods to allow farmers to track the weight and feeding requirements of their fish. The prototype 'walkthrough' video demonstrating how to use the calculator tool that developed in response to farmer's feedback was positively received and led to a broader suggestion of an FAQ video library for the platform. In this way, the participative process forced the design team to take a step back and look at the broader picture, recognising that an instructional video can embed support into the digital solution design.

Through our interactions, two key aspects of the Buna platform emerged as highly valuable to the farmers: access to technical information on fish farming and the potential for community building. While community building may not have been the initial goal of the platform, the farmers expressed a strong interest in engaging with the platform to connect with and educate other farmers, fostering a sense of community and support. This aligns with criticisms of current mobile design trends that discourage real-world interaction and highlights the importance of accommodating users' needs and aspirations (Robinson et al. 2014, p. 17).

The discussions also touched on the frustrations farmers faced in their interactions with extension officers and government support. Farmers recognised the limitations of these services (i.e., that officers have travel and time limitations, and in addition to aquaculture farmers, are also tasked with crop farmers and beekeepers) but suggested that the platform could facilitate positive communication

and collaboration between farmers and officials through features like forums and chat functions. This echoes the need for human mediators in the overall system, as emphasised by Medhi et al. (2011, pp. 2, 10). The platform can complement and enhance human interactions rather than replace them entirely, ensuring continuous training and assistance for farmers while enabling monitoring and evaluation.

The farmers' interest in customising their profiles and creating their own content is promising, as it aligns with the idea of co-designed solutions that promote local adoption. User-generated content, particularly in local languages, holds significance in facilitating the acceptance and utilisation of technology among users with limited literacy or digital proficiency (Zelezny-Gree et al. 2018). However, challenges arise in ensuring the accuracy of user-generated content. Nonetheless, allowing users to customise the content, interface layout, and functionalities of the platform according to their needs and preferences is crucial, as emphasised by the assertion of incorporating users' cultural identities, literacy levels, and technological exposure (Srivastava et al. 2021, pp. 15, 136).

In summary, the participatory design process with farmers highlighted the importance of technical information access and community building within the Buna platform. It also sheds light on the potential for improved communication between farmers and government officials, the value of user-generated content, and the need for customisation options that cater to users' diverse needs and preferences. By considering and integrating these insights, the platform can better serve users from under-resourced communities and contribute to their empowerment in the context of the Fourth Industrial Revolution.

Conclusion

The participation of farmers in the redesign process offered insightful suggestions on designs, functions, and content – demonstrating how their tacit knowledge could be leveraged in the design of digital solutions. Some of these suggestions raised new challenges or "wicked problems" that will drive further development of the platform and potentially challenge the original intentions of Buna. The significance of engaging with users lies in the opportunity to leverage their insights for the long-term development and design of a platform that caters to user needs (Jones et al. 2017, p. 169).

Beyond the scope of this project, but specifically in the African context, we suggest participation design methods can be used as a strength-based way of engaging communities in digital design collaborations, allowing them to actively participate in 4IR. In this way, 4IR is something that is developed with, rather than for communities – and communities are empowered to decide how they want to engage with such systems. In doing so, sustainable, and inclusive development of design solutions can be encouraged in a manner that is community driven and culturally relevant, rather than externally imposed.

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Integrating design concepts learned in the classroom with real-life issues: A case study

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Abstract

Community service learning (CSL), generally known as service learning, is a method of teaching and learning in which specific needs in the community are combined with learning objectives and goals to stimulate meaningful learning experiences. CSL provides students with opportunities to relate and channel what they have learned in the classroom to real-life situations in the community. In recent years, there has been a growing interest in integrating CSL into higher education training programmes. This paper aims to discuss the research on CSL in art and design higher education. Even though this approach is accepted and already being employed in some South African art and design higher educational programmes, not much has been done to analyse its impact on the curriculum compared to other fields, such as teacher education. As such, this method of teaching and learning has yet to be fully explored in the art and design sector. Some of the challenges for integrating CSL into the curriculum include the placement of community engagement within the academic structures and the limited time available at universities. For the current study, a project brief was developed to assess selected university students' academic and personal experiences towards integrating a community engagement project as part of the curriculum in "a leading South African design education institution". Purposive sampling was used to select 12 students at both the 4th and 5th levels and who were at their exit levels in 2021. Data was collected by means of an online questionnaire that included multiple-choice, open-ended, and Likert scale questions. Feedback from participants shows that integrating CSL in real-life situations enriched and deepened their learning experience. The findings of this study suggest that CSL has potential for exploration and can be an effective tool for personal and academic development for university students.

Keywords: Art and design education, community engagement, community service learning, real-life situations.

Introduction

In recent years, community service learning (CSL) has increasingly been adopted by universities and colleges across diverse fields of study in South Africa. However, despite its significant level of acceptance, there is still much to be learned about its impact on the curriculum and student learning outcomes in different fields of study. One area in which CSL is gaining interest is art and design higher education. As creative fields, art and design provide unique opportunities for CSL that go beyond traditional academic disciplines. For example, students in art and design programmes can engage with

communities to create public art installations, design public spaces, or work with local organisations to address social issues through art and design projects (Grodach 2010). In South Africa, some art and design higher education programmes have already embraced CSL, recognising its potential to enhance students' artistic and civic development. However, not much research has been done to analyse the impact of CSL on the curriculum and student learning outcomes in these programmes compared to other fields, such as teacher education.

One of the key challenges in implementing CSL in the curriculum is the significant time commitment required from students, making it difficult to balance the CSL placement and the heavy workload from other courses, jobs, and family responsibilities (Levkoe, Friendly & Daniere 2020). Art and design institutions thus often face difficulties in effectively integrating community service projects into their programmes due to the diverse demands presented by the curriculum.

To address these issues and examine the impact of CSL on art and design higher education, this study focuses on a leading South African design education institution. The research employs a project brief that evaluates university students' academic and personal experiences related to the integration of a community service-learning project within the curriculum. The study furthermore utilises purposive sampling, selecting 12 students from both the 4th and 5th levels who were at their exit levels in 2021. The students were tasked with creating promotional materials for an organisation, with a focus on addressing gender-based violence in Bloemspruit, a region in Bloemfontein with high rates of such violence. The design materials effectively represented the organisation's identity and were intended for use in programmes and community discussions. In particular, this project was part of a credit-bearing module designed for Communication Design students.

Data for this research was collected using online questionnaires that comprised multiple-choice, open-ended, and Likert-scale questions. By gathering feedback from the participants, the study aims to explore how incorporating CSL in real-life situations enriches and deepens the learning experience for art and design students.

The findings of this study aim to contribute to the body of research on CSL and also to provide valuable insights for future pedagogical practices in the field of art and design education. It is hoped that this can pave the way for further exploration and implementation of this approach, ultimately enhancing the educational experiences of university students and strengthening the connection between academia and the community.

Research question

The primary research question that this research asks is:

- How does CSL affect the curriculum and student learning outcomes in South African art and design higher education programmes?

Literature Review

Introduction

Community service learning (CSL) has become an increasingly popular pedagogical approach in higher education, particularly in the fields of teacher education, medical and nursing disciplines, as well as sociology and criminal justice to mention but a few (Salam, Iskandar, Ibrahim & Farooq 2019). By combining academic learning objectives with community service activities, CSL aims to provide

students with meaningful and authentic learning experiences, while also contributing to the betterment of local communities. However, while the benefits of CSL have been widely documented in teacher education and other fields, relatively little research has been conducted on its impact on the curriculum and student learning outcomes in art and design education, particularly in the context of South Africa. This literature review aims to explore the existing research on the impact of CSL on art and design education in South Africa and identify the key themes and issues that emerge from this body of literature.

Theoretical and pedagogical foundation for CSL

John Dewey's experiential learning

The origins of CSL can be traced to John Dewey's (1859–1952) theory of experience and education way back in the early 20th century when he and other education philosophers emphasised the importance of personal experiential learning and community engagement (Pacho 2015). Dewey's concept, suggests that education should have the power to influence social and political change as well as create democratic communities. This principle aligns with experiential education's viewpoint that knowledge is gained through personal experience (Higher Education Quality Committee 2006, p. 14).

Paulo Freire's critical pedagogy

Educator and philosopher Paulo Freire (1921–1997) played a significant role in shaping the theory of service learning. His concept of critical pedagogy challenges existing norms and power structures through education. According to Freire, education has the potential to transform society by fostering a learning process between students and teachers than a one-sided transfer of information. The principles of service learning, where students actively participate in community service activities aimed at addressing real-world problems align with Freire's theories. Additionally, they critically reflect on their experiences. Consider underlying social and political issues that may exist. This educational approach helps students develop their thinking skills instils a sense of responsibility within them and encourages them to contribute positively towards meaningful societal change. These aspects strongly resonate with Freire's visionary perspective.

Cultural-Historical Activity Theory (CHAT)

Researchers exploring community service learning also recognise the contributions of Paulo Freire alongside John Dewey while emphasising the significance of Cultural-Historical Activity Theory (CHAT). CHAT draws inspiration from Lev S. Vygotsky's ideas – a psychologist from the past century – further enriching the understanding around this field. This theory suggests that our actions are impacted by the cultural environment we are immersed in. Our engagement in cultural activities plays a role in shaping how we think and develop cognitively. In the context of service learning, this theory suggests that engaging in meaningful community service can provide students with opportunities to participate in activities that are relevant to their society and culture, thereby enhancing their learning and personal growth.

A research by Cong-Lem (2022) examines the impact of Vygotsky's Cultural-Historical/Sociocultural Theory (VST) in education. The paper emphasises the confusion that arises from combining VST with other cultural-historical traditions, specifically Aleksei Leontiev's and Yrjö Engeström's versions of Cultural-Historical Activity Theory (CHAT). Three generations of CHAT are identified: the first generation emphasises social interactions, scaffolding, and cultural tools; the second generation

introduces activity systems, highlighting the interplay between individuals, goals, tools, rules, and division of labour; the third generation emphasises collective agency, collaboration, and addressing societal contradictions to foster expansive learning and societal change.

The Intersection between Dewey's Experiential Learning, Freire's Critical Pedagogy, and CHAT

By incorporating these theoretical foundations, CSL aims to promote social responsibility, critical thinking skills, and a commitment to positive social change among students. The combination of Dewey's emphasis on experiential learning, Freire's focus on questioning and transformative education, and Vygotsky's understanding of the social and cultural aspects of human development contribute to the theoretical framework that supports service learning. These foundations enable the design and implementation of CSL programmes that actively involve students in their communities, reflect on their experiences, and contribute to significant societal change (Bringle & Hatcher 1995, p. 112; Jacoby 1996).

Challenges in CSL implementation

1. *Balancing theory and practice:* Although the theories presented above have significantly influenced the development of CSL and are generally accepted for future research, it is important to acknowledge that they also have limitations and have been subjected to various criticisms. One criticism of Dewey's theory is that it can be challenging to implement in practice, particularly in complex educational settings. Miettinen (2000) argues that when considering how we acquire new knowledge about the world, the model of experiential learning is not sufficient. Miettinen (2000) believes that the concept of experience, with its humanistic connection, only serves an ideological purpose by promoting the belief in an individual's natural ability to grow and learn. This aspect of experiential learning makes it especially appealing to adult education theorists and the concept of lifelong learning.

Paulo Freire's pedagogical theory seems to be both captivating and challenging, attracting some while frustrating others. Some of his critics have raised concerns about its practicality and integration into mainstream educational practices. Others have had problems with his utopian ideals (UKEssays 2018), his method, and his simplistic division of oppressor and oppressed. Some argue that his ideas may not be applicable in developed settings and question their relevance within academia (Avoseh 2009, p. 129). It is also interesting to note that some critics have also pointed out issues with Freire's use of language, describing it as clumsy and gender insensitive (Shudak & Avoseh 2015).

2. *Assessment and evaluation:* Reflective learning, as emphasised by Dewey, not only helps individuals gain a better understanding of certain topics but also promotes personal development and empowers them to take meaningful actions in their lives, ultimately contributing to the broader goal of collective liberation (Holdo 2023).

When evaluating the impact of community service learning (CSL) both qualitatively and quantitatively, it is necessary to develop assessment methods that accurately capture both the learning outcomes and the benefits, for the community. For example, in a study conducted by Ash, Clayton, and Atkinson (2005), the intentional link, between evaluating student learning outcomes in service learning and the practice of reflection was explored. These scholars devised a method that utilises students' reflections as data for assessing and enhancing both student learning and broader programme-wide approaches to reflection.

To facilitate this, process two tools were developed to provide guidance to students when writing their pieces. Additionally, rubrics were utilised to evaluate the quality of thinking expressed in these reflections. The findings suggest that these tools have proven effective in enhancing students' higher-order reasoning skills and critical thinking abilities across domains such as

improvement, civic engagement, and personal growth. Consequently, this has led to an enhancement in the quality of their learning experiences. However, the assessment also highlights the importance of making improvements with regard to academic learning outcomes.

3. *Cultural sensitivity*: Batiibwe's (2019) review of Cultural-Historical Activity Theory (CHAT) identified two main concerns. Firstly, there is a lack of clarity between CHAT and Activity Theory, leading to confusion among researchers. Secondly, while CHAT has been used in education research, there is a shortage of papers applying it specifically to mathematics classrooms. Even among the few studies that use CHAT, its full potential remains untapped. The implications of this review for Ugandan teachers stress the significance of fostering active student engagement and creating collaborative spaces to enhance dialogue and interaction during the teaching and learning process.

In addition to these concerns, Rogoff (1990) does not agree with the assumption that CHAT may be universally applicable to all cultures. According to Rogoff, the idea of scaffolding, which heavily relies on verbal instruction, may not be equally effective or relevant in all cultural contexts or for all types of learning. Some cultures may find other methods, such as observation and practice, more effective for acquiring certain skills.

In concluding this section, it is worth mentioning that although these theories have their limitations, they still provide valuable insights and frameworks for understanding and implementing CSL. By combining Dewey's Experiential Learning, Freire's Critical Pedagogy and CHAT in CSL, there is potential for crafting experiences that can bring about meaningful transformations. Addressing the challenges and adapting the theories to specific contexts can help educators and researchers effectively leverage CSL to promote meaningful learning experiences and positive social change.

Research on CSL in higher education

Several studies have investigated the impact of CSL on student learning outcomes in art and design education. A study by Pacho (2019), for example, highlights the importance of service learning as a transformative pedagogy that can ensure that learners are well prepared for the labour market and for the transformation of society. According to Pacho, the key components of service learning are service to the community, reflective practice, and learning from experience.

Resch and Schritteser (2021) found that teacher educators play both expert and supportive roles and recognise multiple benefits of service learning. Their study, which examines the application of service learning in Austrian teacher education, indicates that teacher educators distinguish between five orientations in CSL, namely connecting theory and practice, engagement, community needs, job-related skills, and learning outside the classroom. The authors emphasise the significance of service learning in promoting inclusive education and preparing pre-service teachers to address the challenges posed by diverse student populations by providing opportunities to engage with real-world problems in schools.

Cloete and Erasmus (2012) conducted a study that showcases the effective integration of service learning in music programmes within higher education. They specifically focused on the capstone service-learning module of the University of the Free State's Odeion School of Music as an exemplary model for other arts and humanities programmes. The module is described as a clear and structured approach to community engagement, promoting goal-oriented participation. The authors argue that it is crucial for higher education programmes to improve their responsiveness to the distinct challenges and opportunities of a world that frequently lacks empathy and compassion.

Service learning in art and design education: Challenges and limitations

Although service learning has been recognised as a transformational pedagogical practice that offers immense potential for higher education, its institutionalisation in the academy has nonetheless been hindered by pedagogical, political, and institutional challenges, as rightly noted by some scholars. Butin (2006) argues that service learning faces significant limitations that may require a reframing of its assumptions and practices to allow for a more authentic institutionalisation. Thus, understanding the limits of service-learning institutionalisation and critically examining its assumptions may be crucial for advancing its implementation and impact in art and design education.

Implementing CSL in art and design education can pose unique challenges, a given which may be particularly true for South Africa. A research project by Westraadt (2018) highlights the challenges faced by fourth-year Bachelor of Education students specialising in Art Education with practical teaching experience, including teaching art to children from a children's home, managing difficult behaviour, and emphasises the importance of effective classroom management in an art setting. The project aimed to address the limited time for teaching art during student placements. Despite the challenges, the project benefited all parties involved, fostering the holistic development of the children, and facilitating the students' growth as educators. The project demonstrated the practical aspects of art education and had a lasting impact on everyone involved.

Yet another challenge relates to proper communication and interaction between all the involved parties, i.e., with reflection and learning taking place between students, instructors, and community members (Toporek & Worthington 2014). These researchers assert that when third parties are involved in the service-learning initiatives, it might be challenging to maintain adequate communication and engagement between all three parties.

Furthermore, for CSL projects to operate effectively, funding and resources are needed. Academic institutions may find it difficult to sustain these projects over a longer period of time without financial assistance (Salam et al. 2019). This can be due to the lack of funding for the personnel, materials, and resources to support the project. It may also be a challenge for students to commit to service-learning projects particularly if they must work to support themselves financially (Salam et al. 2017). Additionally, lack of funding may also affect the community partners involved in the service-learning project as well since they may need resources and support to fully participate. As a result, securing financial assistance is critical for the successful execution and sustainability of service-learning initiatives in academic institutions.

The adoption of an appropriate model of service

The brief background presented above indicates that in order to integrate community service and civic engagement into the formal structures and practices of higher educational institutions for art and design education, a critical examination of its assumptions and practices, as well as an understanding of the unique challenges in this field are necessary. Although this teaching method may provide significant benefits to students, it can also present some considerable challenges as well. These include issues with incorporating it into the curriculum, ethical concerns, and effective communication among students, instructors, and community partners. For CSL to be successful and sustainable, it is crucial to have sufficient financial support and conduct thorough evaluations of its impact.

Methodology

Data collection

The purpose of this research was to assess how CSL affects the curriculum and the learning outcomes of students. The study employed a mixed methods approach primarily relying on case studies conducted online. There were 12 communication design students who were (at their exit levels in 2021 from both the fourth and fifth levels) purposively selected as participants.

Data was collected through a survey that covered aspects such as participants' background information, their perspectives and experiences with the project and the impact of the artworks created for the campaign. The survey utilised a combination of multiple-choice questions ended inquiries and Likert scale measures as data collection tools. Multiple-choice questions aimed to gather data on students' previous experience to CSL, their perceptions regarding its influence on their learning outcomes, as well as challenges and opportunities related to incorporating CSL into the curriculum. Open-ended questions were used to collect qualitative data on students' perceptions of the benefits and limitations of using CSL in art and design education along with suggestions, for improvement. Finally, Likert scale questions were chosen as they are widely utilised to gauge attitudes and perceptions (Likert 1932). These questions were employed to evaluate the extent to which students agreed or disagreed with statements regarding the influence of CSL on their achievements.

Ethical considerations

1. *Informed consent:* Although a formal ethical clearance was not obtained, all participants were informed about the data collection process, its purpose, and the intended use of the data. The participants were assured that their responses would remain confidential.
2. *Protection of participant rights:* Safety precautions and measures were also considered to protect the rights and privacy of participants, ensuring that their responses would be kept anonymous and in a way that maintains their confidentiality.
3. *Justification for exemption:* The reason not to seek ethical clearance was that the data collection was primarily for the improvement modules involved, and that it did not involve any vulnerable populations or sensitive information.

Data analysis

The collected data was then analysed using descriptive statistics to determine the advantages and disadvantages of integrating community service learning (CSL) into the curriculum and its influence, on students' learning outcomes. The choice to use descriptive statistics was influenced by a small sample size, which was insufficient to draw valid conclusions or generalise findings to a larger population. However, descriptive statistics allowed us to summarise and analyse the available data. This also enabled a better understanding of the students' opinions on CSL and how it influenced their academic learning experiences.

For all items in the survey, responses ranged from one to five. The total score for the scale items was then calculated; means and standard deviations were calculated for each of the items in the questionnaire. The results were presented in a histogram.

The results

Response rate

In this study, 12 students were purposely selected to participate. However, only six of them completed the questionnaire, thus resulting in a response rate of 50%. In total, out of the six completed questionnaires, all were participants at postgraduate diploma level (compare Figure 1 below). Out of the 12, two participants did not complete the questionnaire in its entirety while four chose not to respond to the questionnaire at all. Given the fact that the completion of the questionnaire was voluntary, some participants must have felt that they were not bound to complete it or even to provide any input or feedback. Evidently, this voluntary nature of the questionnaire had a decisive influence on the response rate. This is believed to be one of the reasons behind the lower response rate and strongly indicates that participant choice played a significant role in the incomplete or non-responses recorded.

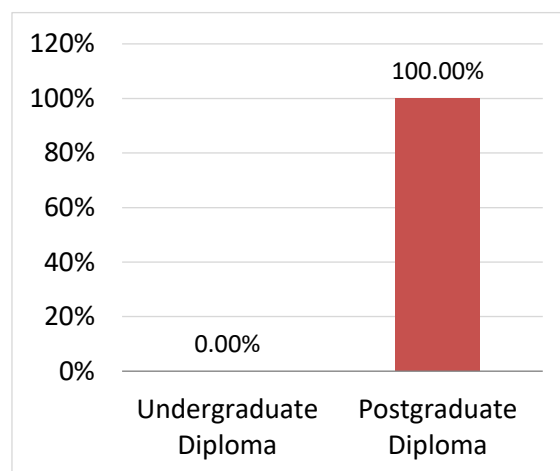


Figure 1: Response rates of participants across educational levels

To gain a better understanding of the participants' views, experiences, and perceptions of the campaign and the artworks, a more detailed account of the descriptive statistics will now follow:

It is noteworthy that the majority of respondents were male, accounting for 83.33% of the total population, while the remaining 16.67% were female. This gender distribution sheds light on the demographic composition of the participants.

Examining the participants' work and study patterns, approximately 50% of the respondents reported juggling their studies with 20 or more hours of work per week. This highlights the significant proportion of individuals who maintain an active work schedule alongside their educational commitments. In terms of study mode, the most common approach was a combination of on-campus and online learning, which was preferred by 66.67% of the participants.

Moving on to the community engagement aspect, on average, respondents had completed 1.833 community engagement projects throughout their studies. This figure provides an indication of the level of involvement and commitment to community-oriented initiatives demonstrated by the participants.

When inquiring as to the aspects they enjoyed the most in the project, respondents cited several factors. Half of the participants expressed appreciation for the presence of clear responsibilities,

emphasising the importance of well-defined roles within the project. Additionally, 25% of the respondents found great satisfaction in witnessing the project come to life, indicating their enthusiasm for seeing their efforts materialise. Furthermore, 12.50% of the participants valued the online meetings and interactions they had with clients, recognising the benefits of virtual communication.

Moving on to the ratings of the CSL Project, the project received consistently high average scores across various dimensions. As demonstrated in Figure 2, participants reported positive experiences in terms of educational value, with an average score of 4.333. The project was also deemed beneficial to academic learning, as indicated by an average score of 4.667. In terms of professional interest, personal interest, quality of work completed, and understanding of clients' needs, the project received average scores of 4.333, 4.167, 4.667, and 4.333 respectively. The ratings presented above indicate that the participants were generally satisfied with the project and its impact on their academic and professional development.

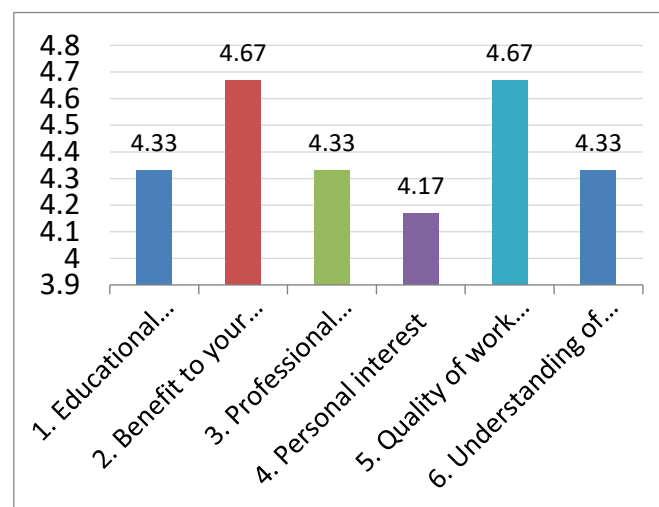


Figure 2: Participants' satisfaction ratings on academic and professional development

In terms of the participants' readiness to communicate and collaborate with clients in their chosen career path, the majority (66.67%) indicated that they were very likely to do so. This demonstrates their sense of readiness and confidence for their career aspirations.

When reflecting on the challenges faced during the project, a few common issues were noted by the participants. These included having to work with a logo of low quality, delays in obtaining information that must be included in the pamphlet and other promotional materials. These challenges shed light on the issues that emerged throughout the project.

Lastly, participants shared their recommendations for making improvements. They expressed a need for more challenging design work, indicating a desire for opportunities to enhance their skills and tackle complex projects. They also mentioned the importance of gaining experience in different environments, showing a desire for diverse learning experiences. Improved time management was another area highlighted for enhancement, indicating that participants recognised the value of efficient project coordination.

While the descriptive statistics offer valuable insights into the participants' perspectives, it is essential to acknowledge the limitations imposed by the small sample size. Due to the relatively small number of participants, the generalisability of these findings is limited, and caution should be exercised when applying them to broader populations or contexts.

Discussion

The findings from this study shed some light on students' perceptions of CSL and its impact on learning outcomes, as well as students' confidence in commencing work in their field of study. The positive ratings and enjoyment of various aspects of the project indicate that CSL has the potential to enhance students' academic and professional development. However, challenges such as low-quality visuals provided by the client and time management issues should be addressed to improve the overall CSL experience. The suggestions provided by the students offer valuable insights for curriculum integration and pedagogical enhancements. These findings contribute to the growing body of knowledge on CSL.

Based on the data collected, it is evident that community service learning (CSL) programmes have a positive impact on students' perceptions and experiences. Most students (80%) mentioned that participating in the Re ya Aha Foundation project helped them to be aware of the community issues and increased their sense of social responsibility. This shows that community service learning (CSL) programmes effectively involve students in community service and contribute to their personal and professional growth.

In addition, when students were asked about the opportunity to interact and work effectively with clients in their future careers, a significant number (67%) said that the Re ya Aha Foundation project greatly enhanced this aspect. This indicates that CSL programmes not only provide valuable experiences in community engagement but also improve students' skills in dealing with clients and communicating professionally.

While the overall perception of the project was positive, some students did encounter certain challenges. These included issues like low-quality logos, delays in logo delivery, and difficulties with managing time effectively. These challenges provide insights for improvement, such as ensuring high-quality project assets and enhancing time management support.

In terms of students' confidence in commencing work in their field of study, the data revealed that a significant majority (83%) felt very confident, indicating that the Re ya Aha Foundation project had positively influenced their readiness to enter their chosen careers.

In addition to the above, it is important to note that when evaluating the outcomes of the CSL initiative, it is crucial to correlate them with the fundamental theories and educational principles that serve as the basis for community service learning. It does seem like the combination of Dewey's experiential learning, Freire's critical pedagogy, and Vygotsky's Cultural-Historical Activity Theory provides a solid framework for designing and implementing CSL programmes that actively engage students with their communities, promote reflection on their experiences, and contribute to meaningful societal change.

However, it is worth acknowledging that these theories do have their limitations. Critics have expressed their concerns about the practicality and application of Dewey's theory, the language usage and idealistic nature of Freire's pedagogy and the cultural limitations of Vygotsky's Activity Theory. It is essential to take these criticisms into account when developing CSL programmes and tailoring the theories to situations.

Conclusion

In summary, the results of this study indicate that community service learning (CSL) initiatives, like the CSL project discussed here can effectively improve students understanding of community issues and

foster a sense of responsibility. These programmes also offer students hands-on experience with clients, boosting their confidence as they begin their careers and fostering an entrepreneurial mindset. However, it is important to acknowledge and address challenges such as resources and time management that may arise during these projects. By addressing these challenges, we can enhance the student experience and outcomes of CSL initiatives.

While CSL shows promise in education, its integration into art and design programmes requires an examination of its underlying principles and methods. It is crucial to be mindful of the challenges within this field to ensure implementation.

Limitations and future considerations

It is acknowledged that the descriptive statistics provide insights into the participants' views, experiences, and perceptions of the campaign and the artworks. However, it is important to note that the small number of participants limits the extent to which these findings can be applied to a larger group. Further research with a larger and more diverse sample to confirm and expand upon these findings is therefore recommended. However, these observations provide helpful insights for understanding the influence of CSL on higher education programmes in art and design in South Africa.

Another limitation that this study encountered was the limited budget of the non-governmental organisation (NGO) and the absence of established partnerships. Although the students were able to contribute their design knowledge and abilities, a lack of funding prevented the project's objectives from being fully realised. This posed a challenge in securing sufficient funds to cover the expenses for the printing service and printing of the promotional material. It emphasises the importance of having funding sources and partnerships for community engagement initiatives for newly established organisations with limited resources.

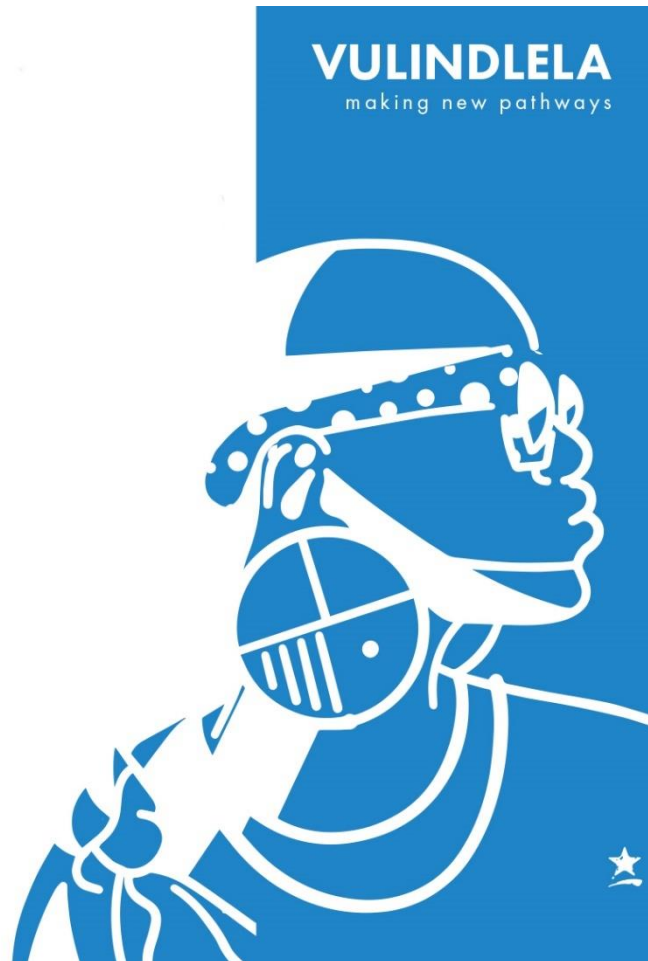
Lastly, due to the COVID-19 pandemic lockdown regulations, it was not possible for the students to meet the client face to face. Instead, a virtual meeting was arranged a meeting for a briefing session. However, this also presented some difficulties such as issues, limited client involvement and interaction and the absence of connections typically found in face-to-face meetings. It is believed that these challenges might have made it challenging for some students to fully comprehend the client's objectives, expectations, and preferences due to the lack of in-person communication.

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SESSION 3: Making





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Designing furniture for the future: Integrating advanced digital technologies into the design process

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Abstract

This paper aims to evaluate how teaching and learning can better equip future designers by integrating advanced digital technologies into the design process. During the continuous unfolding of the Fourth Industrial Revolution (4IR) in South Africa, it is important to consider how to advance design curricula in order to prepare design students for an ever-changing working world. Both the South African Department of Trade Industry and Competition and the South African Furniture Initiative have shown increasing interest in cultivating our local furniture industry. This shows potential for re-imagining the pedagogical approach to furniture design, a traditional avenue within Industrial Design, for a local and advancing industry.

By using practice-based research as a method of generating new knowledge, this paper reports on a second-year student furniture design project undertaken at a leading South African design education institution. The student project focused on designing within the South African context while using advanced digital technologies to lead the design process and final product outcome. While the local context was considered by using available materials or incorporating traditional patterns, this paper focuses on how digital fabrication was used to create new pathways within the design approaches taken during the project. Examples of digital technologies used include 3D printing, laser cutting, and AI design generators.

By reflecting on the project outcomes, this paper aims to speculate on how new digital technologies can be effectively integrated into the design process while resulting in context-appropriate designs. The paper engages with questions such as *As digital technologies grow and evolve, how can they effectively be integrated into the teaching and learning of design? How can design include technological advancements such as AI-generated design while mitigating the problematic disruptions they bring? What opportunities does digital fabrication contribute to the process of design and making in a traditional Industrial Design field like the development of furniture?*

As the field of design evolves with the growth of 4IR, it will become ever more important to continuously question how new digital technologies can be converted into useful tools, while keeping social structures, context, and culture at the forefront of design decisions. By examining a student design practice project, this paper proposes new pathways in teaching and learning through practice-based research.

Keywords: 3D printing, artificial intelligence, design pedagogy in 4IR, digital fabrication, furniture design, laser cutting.

Introduction

The field of Industrial Design has continuously evolved as new technologies and social shifts have emerged throughout history (Ferrari 2017). As the Fourth Industrial Revolution (4IR) unfolds, it becomes increasingly important to evaluate how the role of the designer will shift again and how pedagogical approaches to design need to adapt to it (Adelabu & Campbell 2020). This paper unpacks ways in which South African industries have changed during the 4IR and explains how these shifts have been felt in a traditional Industrial Design industry: the furniture industry. As the country's interest in cultivating this industry visibly increases (dtic 2021), there is potential for re-imagining how higher education institutions engage with the teaching of design skills in order to accommodate the industrial shift that is felt during the 4IR.

With the perspective that practice-based research can offer new insight into how the design process is approached, this paper reports on a furniture design project undertaken in a second-year university Industrial Design course. This paper discusses three selected student projects that integrated a form of advanced technologies into their design process: 3D printing, laser cutting and AI-generated designs. Through the analysis of these projects, this paper aims to provide insight into how digital fabrication can contribute to the field of furniture design within the South African context. Alongside this, the intention is to reflect on how practice-based research provided opportunities to explore new pathways in teaching and learning.

Context

As a socio-technological field, Industrial Design is bound to evolve and shift as human development does through the industrial revolutions (Ferrari 2017). During the mid-18th century, the First Industrial Revolution harnessed the power of steam, and in the late 19th century the Second Industrial Revolution honed the power of electricity, both leading to the large-scale production of goods (Schwab 2017). These revolutions caused societies to shift from being predominantly agricultural to becoming industrial and capitalist (Schwab 2017; Ferrari 2017). During these revolutions, the field of design focused on expanding the uses of materials and manufacturing methods in order to develop mass-produced items suitable for mass consumption (Ferrari 2017). The Third Industrial Revolution marked the introduction of electronic and information technologies, shifting society once again (Schwab 2017; Ferrari 2017) and repositioning the role of the designer from being predominantly product-focused to being service-oriented (Ferrari 2017). As the Fourth Industrial Revolution (4IR) currently unfolds, it is relevant to imagine how the role of the designer may shift again and how pedagogical approaches within design institutions need to evolve for the societal shift that the 4IR causes.

4IR is described as the amalgamation of digital, biological, and physical fields (Schwab 2017). While examples such as smart home devices and AI chat-bots come to mind, it is important to consider another socio-technical shift, the impact of which is felt in the South African context: the de-industrialisation (Barnes 2019). De-industrialisation is described as a decline in industrial activity and a reduction in production quantities within a location or field (Debande 2006). The South African Department of Trade and Industry has identified various factors that contribute to such a decline, including “sub-optimal performance of state-owned companies, sharply escalating administered prices, logistical bottlenecks and other economic infrastructure constraints” (dti 2018). Alongside this decline, however, it is important to note the democratisation of technology, which is a promising advancement that has developed during the 4IR. The term “democratisation of technology” describes how quickly technology has become available, affordable, and user-friendly to general users (Urbanski

2000). Perhaps even more than the evolution and development of digital technologies, the newfound accessibility to these technologies is what is shifting societies. The democratisation of technology will arguably impact how design approaches evolve within traditional design industries, such as the design and manufacture of furniture.

The described development caused by the 4IR can be clearly observed within the South African furniture industry. During the late 1990s, the industry was dominated by large industries such as Ellerines, Bears, and Joshua Doore whose focus' fell on the mass-production of standard items (Ward et al., 2017). As the global furniture industry went through a significant shift during the 1990s, however, the South African market fell at a disadvantage (Ward et al., 2017). Through the rise of globalisation, Chinese exports of cheap and mass-produced furniture challenged the dominance of Anglo-Saxon industries that focused on small-scale, handcrafted, quality furniture (Ward et al., 2017). As a result of this industry shift, the approach towards furniture changed to become design-driven instead of craft-orientated (Ward et al., 2017). Innovation and adaptability became relevant advantages and through the democratisation of technologies, small-scale, machine-made batch production became the new approach to furniture design and manufacture (Dunne 2000). Globally, the furniture industry has been polarised into two areas where Italy, Germany, Scandinavia, and some parts of Eastern Europe lead the higher quality and price market, while China dominates the lower quality and price bracket (Walcott 2014). In comparison, the South African furniture industry fell at a disadvantage, lacking skilled labour and quality local materials, being in poor proximity to importers, lagging behind on international trends and competing in a well-established market (Dunne 2000). The large South African furniture companies were unable to complete, and reflecting the de-industrialisation, the majority of them have folded (dtic 2021). The current South African furniture industry is predominantly comprised of small and midsize enterprises (SMEs) (dtic 2021). While this does not mitigate many of the disadvantages the industry has, it does allow for adaptable and design-focused companies. Along with increased accessibility to new technologies, the South African furniture industry has many new initiatives supporting industry growth, such as the South African Department of Trade and Industry (DTIC), the South African Furniture Initiative¹ (SAFI) and Clout/SA² (dtic 2021).

With this industry change in mind, there is potential for re-imagining the pedagogical approach to furniture design, a traditional avenue within Industrial Design, for a local and advancing industry. In order to consider how this is done, it is important to engage with how the 4IR impacts teaching and learning within design institutions. The jobs that exist today may not exist in a few years' time and positions we cannot yet imagine will come into being (Harari 2019). Today's students will most likely not stay in a singular job during their lifetime and are instead more likely to change careers multiple times (Harari 2019). As the Fourth Industrial Revolution continues to impact and change the landscape of the working world, it is important for higher education institutions to engage with new technologies and speculate on how these will impact the methods and processes that are taught (Adelabu & Campbell 2020). Pedagogical experts have emphasised the need to shift content from training hard skills to including the teaching of soft skills such as communication, creativity, and problem-solving (Chaka 2020). While the necessary change in soft skills taught in higher education has been speculated on, it is also important to address how higher education institutions should engage with preparing students for the inevitable change in hard skills needed in industry (Chaka 2020). In a field such as

¹ South African Furniture Initiative (SAFI) is a joint initiative between industry, labour and government promoting the development and growth of the South African furniture industry (SAFI, 2023).

² Clout/SA facilitates collaboration between designer-makers and potential buyers with the goal of promoting South Africa's creativity, artisanship, and heritage (Clout/SA, 2023).

Industrial Design, research through practice and experimentation may be an effective method of preparing students for 21st-century skills (Chu et al., 2017), such as having to both engage with and potentially create new technologies and manufacturing methods. Therefore, the student furniture design project explored in this paper was undertaken through practice-based research.

Methodology

Practice-based research refers to a research approach in which research and practice act as complimentary processes for generating new knowledge (Candy et al., 2021). Practice-based research falls within the field of action research, which is a process that can be used for improving educational practice through action, evaluation and reflection (Clark et al., 2020). The intention of action research within pedagogy is to collect relevant information for improving practice (Clark et al., 2020). It is a collaborative process that is situated within the teaching and learning environment and new knowledge is created through action (Clark et al., 2020).

The project that informed this study was undertaken within a second-year Industrial Design practice module at the University of Johannesburg in 2022 with a class of 25 students. The students conducted a traditional furniture design project that focused on the South African context while having to integrate a form of digital fabrication into their design process. In order to conclude the project, students reflected on the potential that digital fabrication offers within the South African context and submitted their reflections on an online survey. Their answers were compiled and thematically analysed, similarities were identified, and any significant insights were highlighted. Along with these reflections, the students documented their project processes and outcomes within online portfolios, which were reviewed and the advantages and disadvantages that occurred during the integration of advanced technologies were documented. Three projects were selected in order to illustrate significant and varied methods of implementing digital fabrication and are discussed in this paper. Through this process, the research aim of this project was to identify potential ways of re-imagining the pedagogical approach to furniture design, a traditional field within Industrial Design, as the impact of advanced technologies becomes more prevalent.

Project brief

The project brief was adapted from the 2022 DTIC Furniture Design Competition requirements and read as follows:

The COVID-19 pandemic has caused significant disruptions to the global supply chain and highlighted the need for some level of self-reliance, as well as opportunities for import substitution and localisation. This also speaks to the importance of the sustainability of raw materials in manufacturing, and raising consciousness on where and how inputs are sourced. Businesses are therefore now forced to be more agile in how they react and adapt to crises in supply. Against this background, you are asked to design a furniture piece that will respond to these challenges and embrace localisation, celebrate the South African heritage, and portray South African identity.

Further design considerations were communicated, including the need to be innovative as well as integrate a form of digital fabrication into the design process or outcome. Students could choose from a variety of advanced technologies available within the department, including CNC routing, laser engraving, and CNC vinyl cutting. The three selected projects discussed in this paper made use of 3D printing, laser cutting, and AI-generated designs. The projects were chosen for discussion as they

offered interesting insights into the contributions digital fabrication can offer a traditional Industrial Design field such as furniture, particularly within the South African context.

Project outcomes

3D printing

The first student furniture design project discussed in this paper is a chair designed to be CNC cut from 18mm plywood and assembled through interlocking slots within the cut sheets (Figure 1). The design element that is focused on within this paper, however, is the leather strap seat that has a custom pattern design embossed into the material. The pattern embossing was created through a traditional technique of leather stamping, but as opposed to using a traditional tool, the stamp was 3D printed.



Figure 1: Student chair design (2022)

3D printing is an additive manufacturing technique whereby a 3D physical object is formed through the layering of material one slice at a time, as seen in Figure 2 (TWI 2023a). The 3D model that is printed is first created using computer-aided design (CAD) before being digitally sliced into horizontal layers, specifying the shape and structure of each layer to create a file that can be sent to a 3D printer (TWI 2023a). The 3D printer then builds the model layer by layer (TWI 2023a). Multiple methods of 3D printing exist including but not limited to fused deposition modelling (FDM), stereolithography (SLA) and selective laser sintering (SLS). Each of these methods has its own process and materials (TWI 2023a).

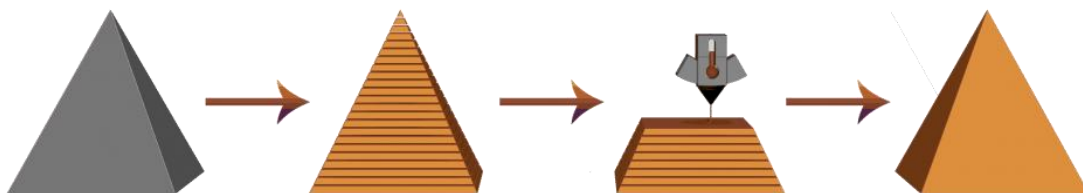


Figure 2: How 3D printing works in four steps (My3DConcepts, 2023)

Leather stamps are traditionally machined from brass or stainless steel, a subtractive manufacturing process that removes material until the inverted image of the stamp design exists as a debossed form. This tool is then knocked into the leather with a hammer, leaving the design embossed within the

material. In the discussed furniture project, the student alternatively 3D printed the leather stamping tool (Figure 3), revealing the advantages that using digital fabrication could offer within this more traditional, hand-manufacturing process.



Figure 3: 3D printed leather stamp (2022)

In its additive nature, 3D printing is a waste-reducing process, using material efficiently as an object is built (TWI 2023a). In addition to this, the digital manufacturing process used offers design flexibility. As a quick production method, 3D printing allows for rapid prototyping cycles and quick design iterations (TWI 2023a). It also allows for complex designs that would be challenging to produce using traditional techniques (TWI 2023a). Design is a key competitive advantage within the furniture design industry (Dunne 2000; Kraak 2017), making the use of technology that allows for the leveraging of design capabilities an important integration into design practice. Along with flexibility, 3D printing offers customisability and personalisation, two traits that are becoming increasingly necessary to remain relevant within the product design market today (Pallant et al., 2020). 3D printing has become more affordable and accessible, making its use possible within small businesses, by individuals and in educational institutions.

The use of 3D printing with the student furniture design project shows evidence of how new technologies can be integrated into traditional forms of manufacture without compromising the process or aesthetic result. As an added advantage, the use of 3D printing can allow for the affordable and accessible adaptation of designs within furniture.

Laser cutting

The next student project discussed in this paper is the design of outdoor seating made from a used oil drum and reclaimed pallet wood (Figure 4). The student made use of commonly found, used materials that are often re-sold at an affordable rate. Upcycling the drum and pallet wood referenced the idea of objects being used for purposes they were not originally designed for. This is an attitude that Adam Savage refers to in his book *Every tool's a hammer: life is what you make of it*, as being able to fulfil a need with what is available



Figure 4: Student outdoor seating design (2022)

(2019). This practice can be observed in the South African context, where numerous small-scale poverty prevention projects make use of upcycling materials into sellable products (Archer & Bjorkvall 2018), such as converting tin cans into toy cars or creating mats from used tires.

Laser cutting is a manufacturing process during which a high-powered laser beam burns, melts or vaporises a sheet material in order to create a precise and clean cut (TWI 2023b). It is a CNC (Computer Numerically Controlled) process, meaning that the cut file is created digitally, specifying the shape and dimensions of the cut (TWI 2023b). The power, speed and focus of the laser beam are then set according to the material and thickness being cut (TWI 2023b). The material is placed in the bed of the laser cutter and cuts can be controlled to be detailed and intricate (TWI 2023b).

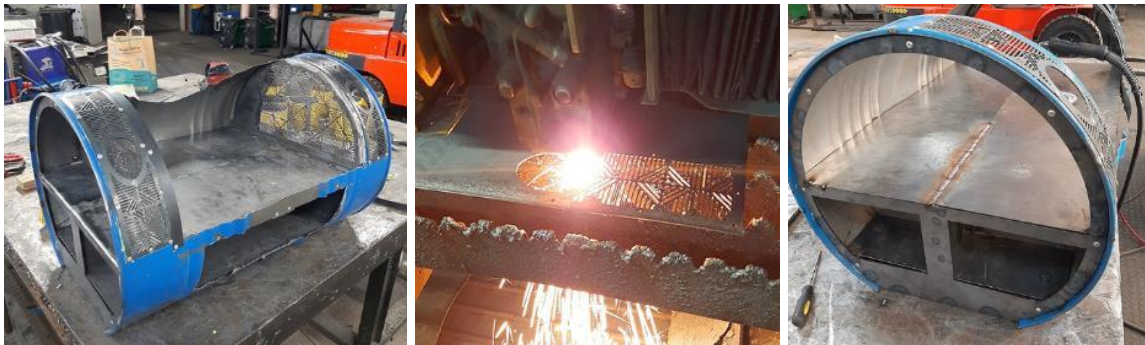


Figure 5: Laser cut components (2022)

In the discussed student design project, the laser cutting of sheet metal was used as a method of modifying the oil drum. The resulting cuts were used to add storage space, drink holders, and aesthetic patterning to the furniture piece (Figure 5). Just like 3D printing, laser cutting is a customisable process making it easy to adjust dimensions to suit the object being modified. It is an affordable process that is suitable for batch production and is readily offered as a service within South Africa.

This student design project is an illustration of how digital fabrication can offer a method of reframing waste materials that are common within a context. As the practice of upcycling is frequent within South Africa, particularly in small-scale production (Archer & Bjorkvall 2018), laser cutting can provide a way of making upcycling an accurate and replicable process, while being able to customise designs to the objects being used within a product.

AI-generated design

Artificial intelligence (AI) is “a field, which combines computer science and robust datasets, to enable problem-solving. It also encompasses sub-fields of machine learning and deep learning” (IBM 2023). AI-generated work is becoming increasingly accessible in various formats, whether it is a language model like ChatGPT or an image generator such as Midjourney. As the complexity of AI-generated outputs grows and the tools become increasingly accessible to the public, it is important to consider what the evolution of AI will mean for the world of design.

Within the discussed furniture design project, students had the option of integrating AI-generated designs into their design process, specifically during their research phase. The project examined in this section experimented with making use of this method by prompting image-generating AI tools to design South African furniture alongside examining existing local furniture.



Figure 6: AI-generated stool designs (2022)

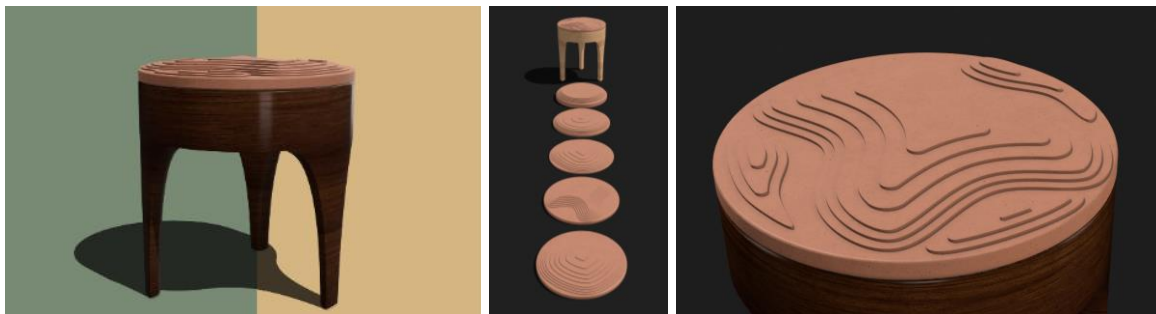


Figure 7: Student stool design (2022)

The integration of AI-generated designs poses an interesting contribution to design exploration. This phase of a project usually consists of investigating precedent designs as a means of researching what already exists as well as guiding the design direction of a project. Existing products form a foundation for creativity, which is defined as the process of creating novel ideas (Boden 1998). More specifically, “combinational” creativity is the process of merging existing ideas in a novel way (Boden 1998). It is also a place for students to gain an understanding of the context they are designing for and within. In this project, precedent studies were used to form an understanding and interpretation of what is considered local, as well as investigate the availability of materials and manufacturing methods in the South African context.

With the prompt of designing South African furniture, the image-generating AI tool simulates an amalgamation of South African furniture designs to generate something new. The tool is, by definition, being creative. However, the resulting images are difficult to contextualise. One cannot recognise what existing designs or objects the tool is drawing from, making the result an intentional reference to a widespread collection of ‘South African’ designs and artefacts. AI image generators are seemingly not refined enough to read into nuance and context, sometimes resulting in very literal and unusable design suggestions. The AI tool also has no reference to materials and manufacturing methods available within the context it is generating designs for. This means that the designs it provides cannot be taken directly to production. Therefore, in the following student furniture project, the AI-generated designs served as inspiration to develop a final design from that was aligned with the local context.

The final product designed using this process was a stool (Figure 7). The student picked up on the three-legged stool design (Figure 6) as it was comparable to a potjie pot, a three-legged cast iron pot that is commonly used to cook over a fire throughout South Africa (de Beer et al., 2022). The student selected SA pine as a material for the stool base, as it is locally grown and readily available. The contour lines that are visible on the top of select AI-generated stools were also developed further as a method

of referencing the topography of the South African Winelands (Figure 6 and 7). In line with this theme, the student chose cork as a material for the stool seats, referencing the cork used in wine bottling. This project is an example of an effective way of using AI as part of the inspiration phase within the design process, while still engaging with further product design development.

Since the completion of this project, students have integrated AI tools into their design process more frequently in order to explore its possibilities and identify its current limitations. Students have strategically prompted AI-powered chatbots to provide them with product design ideas. They have then plugged those suggestions into an AI image generator, which develops unique product designs, essentially eliminating their own ideation process. Furthermore, students have generated contextual product renders of their final design outcomes with AI tools in order to create product advertisements. While the outcomes of these explorations are still limited, AI-generated design can evidently be integrated into the design process. The translation of AI designs into manufacturable products within a specific context is not yet possible. It is, however, important to explore where AI tools can begin to be integrated into the design process as a method of aiding and inspiring designers who will compete in a rapidly changing world.

Student reflections

One of the students found the use of CNC processes enjoyable as it allowed for making easy adjustments to existing design files and speeding up the iterative design process. Being able to change files also meant that the customisation and personalisation of products were possible. Furthermore, it was found that digital fabrication could be used to imitate traditional handmade processes, such as the application of traditional patterns, while allowing products to be batch-producible and accurately replicable. Another student noted that making components through digital fabrication made their assembly process easier.

The business potential that digital fabrication offered small furniture enterprises was also speculated on. Students pointed out that businesses could decrease their turnaround time and production costs by replacing handmade processes with digital fabrication while also increasing the accuracy of product outcomes. In line with this a student remarked, “In an economic climate where small businesses and entrepreneurs are highly valuable and encouraged, digital fabrication makes furniture manufacturing a lot more manageable and accessible to small businesses”.

In general, students found the incorporation of digital fabrication within the furniture design project to be effective and beneficial. Practice-based learning was proven to be an effective way of learning new skills and exploring new methods of engaging with the design process.

Key findings and recommendations

The socio-technical field of Industrial Design has undergone significant changes throughout the industrial revolutions. As the 4IR unfolds, the role designers play and the pedagogical approaches in design institutions are impacted. The South African context has experienced the effects of de-industrialisation, as industrial activities and production quantities decline. However, as the democratisation of technology has increased throughout the 4IR, new technologies have become more accessible, affordable, and user-friendly, offering new possibilities in design approaches. These effects are visible within the South African furniture industry, which has undergone significant changes within the last three decades. The industry has transitioned from being mass-production-driven to

being dominated by small and medium-sized enterprises (SMEs). The democratisation of technologies could offer these SMEs an advantage in being both design-driven and adaptable.

With the rapid changes brought about by the 4IR, higher education institutions need to adapt their pedagogical approaches to prepare students for the evolving demands of the industry, leaving room to examine the approach to traditional fields such as furniture design. As a method of exploring that advanced digital technologies have to offer, practice-based research was used as a means of allowing new knowledge to arise from a second-year student furniture design project.

The student projects revealed that the integration of digital fabrication, such as 3D printing, laser cutting, and AI-generated design provided multiple advantages within the design process. 3D printing enables waste reduction, design flexibility, rapid prototyping, and customisation, which are crucial for staying competitive in the furniture design industry. Laser cutting allows for precise fabrication, customisation, and upcycling of materials, contributing to sustainable design practices. The integration of AI-generated designs into the design process opens up new possibilities for design exploration while highlighting the limitations of using AI tools.

The paper offers insight into how digital fabrication can offer support to the design of furniture within the South African context. The analysed projects illustrate how digital fabrication can aid in generating innovative and sustainable designs that are adapted to the local context. The paper also addresses the need to adapt pedagogical approaches to furniture design in order to accommodate the changes that 4IR technologies are causing within the industry.

It is recommended that students should be equipped with the skills to use digital fabrication technologies and critically engage with AI-generated designs as a means of generating new and creative solutions alongside research and ideation. In order to achieve this, it is suggested that students engage with digital technologies through the design process as a method of informing their design decisions. Furthermore, educators are urged to adopt a flexible and adaptable approach to teaching and learning in order to prepare students for the rapidly evolving working environment.

Through this student design project, it is evident that practice-based research is an effective method of introducing new technologies into the field of teaching and learning, as it allows for new knowledge to emerge through the practice of making. By integrating practice-based research into design pedagogy, we can explore and discover more about what advancing technologies have to offer.

Conclusion

Overall, this paper emphasises the importance of adapting and evolving Industrial Design pedagogy by integrating advanced technologies into the design process as well as exploring the possibilities that AI-generated designs offer. The furniture design student project discussed in this paper is evidence of how practice-based learning can reveal new design processes and manufacturing methods that can reimagine design approaches to traditional fields. The research findings of this project provide insight into how the pedagogical approach to furniture design in South Africa can be reimaged while considering the impact of the Fourth Industrial Revolution.

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Re-storying design research: A case study in the context of postgraduate studies

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Abstract

In the recent five years, the predominant approach followed in the context of postgraduate research in the field of design at Stellenbosch University (SU) has been practice-led. This reflects the Visual Arts Department's integrated, process-oriented philosophy of design. We regard design as an inherently relational practice that connects people, things, places, and ideas, among others. Through the integrated and applied use of multiple media formats. We do not focus solely on the outcome of our practice but are rather interested in using our practice to work towards a more just and sustainable future for all.

The research this paper reflects on engages with two specific practice-led research projects done in completion of the MA in Visual Arts programme at SU; both of which were situated in the broad field of visual communication design. The aim was to gain insight into the kind of structures, skills, and practices that can support and facilitate practice-led design research in the future. Research participants included the two graduates completing these projects and their supervisor. The research was approached from a new materialist perspective and a narrative methodological approach was followed. From this perspective, the cases in question are not merely represented as it unfolded. The projects have been collaboratively re-storied through creative play between image and text to focus on the transformation of future possibilities. It was found that, in the context of practice-led design research, research questions were predominantly geared towards how design practice can reach specific goals, all the while also affecting positive change in real-life contexts. Navigating the entangled relationships between theory and practice was a continuous struggle, as was situating the research within generalised and bureaucratic institutional structures. Finding the most effective way to ultimately present each project as a comprehensive, coherent body of knowledge was similarly challenging. Our story demonstrates that there lies value in participation, collaboration, reiteration, conversation and multimodal material and technological engagement. The subtle nuances emanating from our story indicate that postgraduate programmes engaging in design research at South African higher education institutions could benefit from simultaneously incorporating a more narrowly defined disciplinary focus *and* strategically situating their offering in an extended, transdisciplinary community.

Keywords: Design research, practice-led, postgraduate studies, specialisation, transdisciplinarity.

Introduction

I am Karolien. In a professional capacity, I am a visual communication designer, creative researcher, mentor, and teacher, and acted as academic supervisor for Hesté and Kirsten during the completion of their MA studies in Visual Arts at SU.

Hi, I'm Hesté. And I'm Kirsten. We're both visual communication designers who completed our MA journeys during 2021-2022.

In this paper, the three of us reflect on our collaborative journey in design research; a journey characterised by many ups, downs, and valuable lessons learned. We are interested in exploring the kind of structures, skills, and practices that can support and facilitate productive design research in the future, specifically in a South African context.

Considering design research

Design research in context

Design is inherently a verb. It is a creative practice “aimed at changing existing situations into preferred ones” (Simon cited in Brassett & Marenko 2015, p. 11). It is systematic in its approach, but holds ample room for complexity, uncertainty, and imagination in its processes. It is future-oriented, iterative, and involves the hands-on making of things, ideas, systems, media, and/or experiences. It does not simply aim to solve existing problems, but rather wants to “reframe ideas [and] imagine problems and opportunities to see whether something is necessary or not” (Koskinen et al. 2011, p. 8).

Research, on the other hand, has historically been informed by the scientific tradition where objectivity is key and linear, rational thinking triumphs. Methodologically, this tradition has become a global norm (Haseman & Mafe 2009). It has come to constitute the dominant framework in which postgraduate research programmes at higher education institutions function.

Defined in this way, and putting linear, scientific logic to practice, Design + Research = ERROR. The paradoxical nature of design research as a consolidated concept/practice is not a new insight. It has been considered extensively from a variety of perspectives throughout the past century. In this paper, we will provide insight into the concept from the perspectives of constructive design research (Koskinen et al. 2011) and practice-led research (Haseman & Mafe 2009).

Koskinen et al. (2011) posit that the defining feature of design research is that it relies on *making* as practice, hence their use of the term *constructive* design research. They acknowledge that design research has always been a product of the context in which it has functioned. For example, since the sociopolitical, economic, and technological change ushered in by the industrial revolution inspired a focus on function within mass society – a one-size-fits-all kind of approach – the ‘design methods movement’ that briefly surfaced in the 1960s deemed the aim of design research to be to “describe the natural and human rationalities that govern it” (Koskinen et al. 2011, p. 15). However, as society became more networked, consumers’ needs became more individual, and design had to adapt. It became clear that a rationalistic approach to design research was not adequate. It failed to acknowledge the real-world contexts in which design functioned. During the 1980s and 1990s, design research thus came to be characterised by human-centred, ethnographic, and participatory approaches. Since the 2000s, with the speedy development of information communication technologies, the focus has increasingly been on design practice as *method* and the experiences that this engenders (Koskinen et al. 2011).

Thinking of design as a method that can productively be put to work in real-life contexts resonates with the concept of practice-led research. Carole Gray (in Koskinen et al. 2011, p. 213) provided the first definition of practice-led research in 1996. She held that it is,

Firstly research which is initiated in practice, where questions, problems, challenges are identified and formed by the needs of practice and practitioners; and secondly, that the research strategy is carried out through practice, using predominantly methodologies and specific methods familiar to us as practitioners.

In practice-led research, creative practice hence co-constitutes one's research method/s and may lead to insight into the practice itself and/or about the context and phenomena in question. As with constructive design research, the focus remains on action and process. Haseman and Mafe (2009) have identified six conditions for practice-led research. We believe these align well with design research and will consequently explore our design research experiences through this lens. These conditions include (Haseman & Mafe 2009, pp. 214-217):

1) Resolving the 'problem' of the research problem, 2) Repurposing methods and languages of practice into the methods and language of research, 3) Identifying and deploying emerging critical contexts which are networked out of his or her practice, 4) Identifying and engaging with the 'professional' frames within which practice is pursued, 5) Anticipating and deciding on possible forms of reporting, [and] (6) Deliberating on the emerging aspirations, benefits and consequences which may flow from the demands and contingencies of practice.

Situating design research locally

In their paper 'Postgraduate communication design education in South Africa: Challenges and opportunities', Van Zyl and Naude (2019, p. 344) highlight "the division between postgraduate education [in communication design] and the [professional design] industry". They conclude that,

This gap and [...] lack of postgraduate capacity may be symptoms of the core of the problem: a discipline that is still trying to catch up with the internal shifts from being craft-based to knowledge-based, new knowledge needs and rapid changes in the workplace and technological landscape.

Industry professionals regard higher education as a provider of entry-level technical skills, and "academic research is not seen as a valid or accessible source of knowledge" (Van Zyl & Naude 2019, p. 333). The South African National Development Plan 2030 advocates for the renewal and expansion of the role South African universities play in meeting the needs of local society (NDP 2012). Subsequently, institutions of higher education are placing a high premise on the development of 21st-century skills such as creativity and critical thinking, problem solving, lifelong learning, collaboration, communication, technical skills, information management, ethical and cultural awareness, flexibility, and self-direction (Van Laar et al. 2017). We believe it is imperative that research-driven institutions offering professional degree programmes in design respond to this challenge through considering their postgraduate pedagogical offering carefully.

In the MA Visual Arts programme at SU, specialisation in a variety of creative disciplines is accommodated. Students are required to produce an integrated creative research project. According to the institutional course guide, they are encouraged to produce,

Research that is practice-based in its methodology [...] [and] explores the relationship between practice and theory as dialogical and interrelated, not only in the process that is followed, but also in the final presentation of the research project (2023).

This must be presented in the form of a written thesis and a practical body of work; each of which is due on separate dates, the thesis 4-8 weeks before the practical work. The standard venue for the presentation of practical work is an institutional gallery space. Ultimately, a single mark is awarded to the project.

Internally, the programme is handled flexibly since it acknowledges and upholds the dynamic nature of creative research processes. Students entering the programme with a design background do, however, experience quite a bit of tension, doubt, and anxiety throughout the course of their studies. We suspect this might be because the affective force of *practice-based* work – work focused on the outcome of creative practice as a contribution to knowledge (Candy 2006) – is unwittingly ingrained in the institutional structure of the programme and hence resisting the predominantly *practice-led* research processes that design research engages in. This tension has inspired the research this paper reflects on. We are curious about the reasons for this tension and specifically the implications it may hold for design research in the context of postgraduate studies in the future. What kind of structures, skills, and practices can support and facilitate productive design research in the South African context going forward?

Grounding design research

Given our framing of design research as constructive and process-oriented, we paradigmatically situate it in an onto-epistemological framework. Karen Barad (2003, p. 829) describes onto-epistemology as “the study of practices of knowing in being”. In everyday terms, this boils down to the belief that, in doing design research, one must practice what you preach.

Within this framework, a new materialist foundation supports design research. New materialism proposes that all matter has agency. Matter, in this sense, includes:

Human bodies; other animate organisms; material things; spaces, places and the natural and built environment that these contain; and material forces including gravity and time [...] abstract concepts, human constructs and human epiphenomena such as imagination, memory and thoughts; though not themselves ‘material’, such elements have the capacity to produce material effects (Fox & Alldred 2018, par. 1).

From a new materialist perspective, knowledge only comes to matter – it only comes to exist, to have meaning – as different materials intra-act with each other (Barad 2007). From this perspective, new materialism is not a pre-existing theory that can be applied to the research one is doing but allows one to come to grips with the fact that new ideas and thoughts will emerge and take shape through the practice of doing research, i.e., through *designing* in our case.

Methodologically, we have combined a case study and creative, narrative inquiry approach. A case study research design was relevant since our research aimed to explore the experiences of participants (the three of us) in a specific, real-world context (Yin 2018, p. 64); i.e., we aimed to provide insight into our experiences of being involved in postgraduate studies in design research in the context of an existing MA programme. We were, however, not content with simply *describing* our experiences in this context. We wanted to excavate nuanced insight into the *processes* we were engaged in. We wanted to understand postgraduate design research in the current moment better (Sunday, Ramugondo & Kathar 2020). Integrating case study research with narrative inquiry hence made sense, as narrative inquiry allows one to reconstruct experiences in relation to a range of other people, things, spaces, places, and times (Clandinin & Connelly in Pinnegar & Daynes 2007). Through integrating our individual voices through creative storytelling, narrative inquiry facilitated a means to

describe how design research worked in this case through identifying key concepts that could ground it (Sunday, Ramugondo & Kathar 2020). This, we believe, allowed us to expand the limited scope of using traditional thematic analysis (Nowell et al. 2017) to gain insight into possible answers to our research question. It allowed us to see, feel and make connections that might not have surfaced otherwise.

Given the self-reflective nature of the research, it was declared ethically exempt by SU's Research Ethics Committee. The research does, however, involve reflection on institutional structures and creative output produced by graduates. It was thus imperative to seek institutional permission to conduct the research. This was received from the institution's Division of Information Governance. All participants (i.e., the three authors) provided consent that their identities be known.

In the section that follows, you are allowed into the story that unfolded between us. The process we followed in getting there included 1) a collaborative discussion on our experiences throughout the two-year design research process; 2) each of us individually creating a personal narrative comprised of image and/or text representative of our experience of the process; and 3) us collaboratively working from the three individual narratives to construct an integrated illustrated story. In the concluding section of the paper, we provide a summary of the insights gauged and comment on the value this holds for the future of postgraduate studies in design in the future.

Our story

Hesté: My undergraduate studies were completed at a private institution with a much more commercial focus compared to SU. My expectations for this MA programme were thus uncertain.

Kirsten: I chose to do a master's thesis at SU as I was interested to learn more about a specific design-related topic. Since there are no tertiary institutes in South Africa offering master's programmes in sustainability and materials design, I sought an institution where I would have the freedom to design my own learning experience. But, upon entering the programme, I saw mostly practice-based Art approaches to the degree. All the seminars were Art-centric, so in my practice I tried to emulate this by making drawings of the trash-scapes I was creating from my own trash collection.

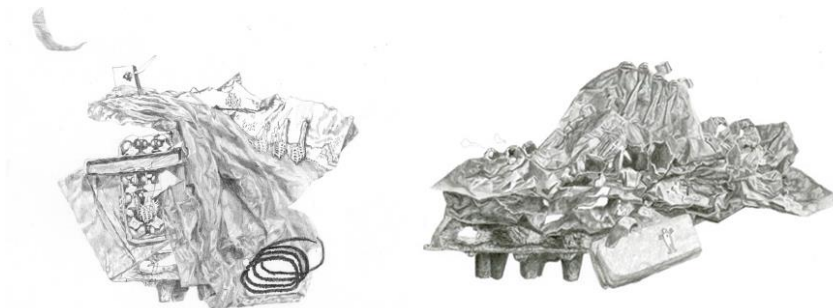


Figure 1: Kirsten 2021, pencil drawings

Karolien: I always encourage students to start *doing* as soon as possible; to think through what they read about their topics of interest by collecting, conversing, drawing, mapping, building, etc. I want them to experience their topics of interest in a material way. I believe this holds great value in the process of figuring out how their research can make a tangible contribution to a more productive, sustainable society.

Hesté: My initial focus was on making physical, multi-sensory images inspired by music.



Figure 2: Hesté 2021, multimedia illustrations

Karolien: These are beautiful images, but what do you want them to do in your research?

Hesté: Not sure... Make people 'feel' something? Make them stop, actually *look*?

Karolien: But why? Who are these people and where/how will they engage with it?

Kirsten: Collecting and drawing my trash helped me imagine alternative future realities.

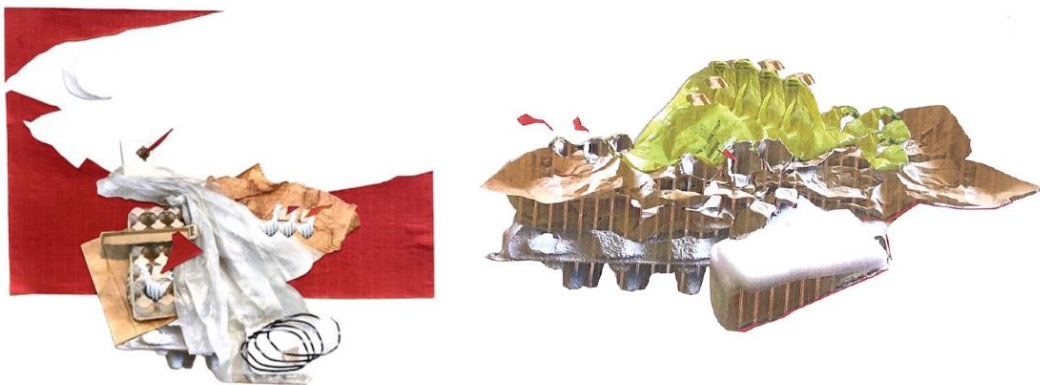


Figure 3: Kirsten 2021, multimedia drawings

Karolien: And what value can this hold in real life? How can you *use* this as part of your research?

Kirsten: I was confused. My journal entries and the quotes I collected to try and motivate myself through the beginning stages clearly show this.

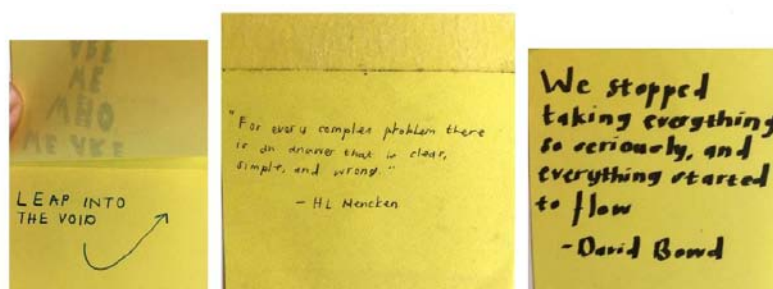


Figure 4: Kirsten 2021, journal extracts

Kirsten: Though I came into this programme with confidence that I would be able to create a design-oriented outcome, not knowing what this looks like in this context, and what would be acceptable, was daunting. It felt as if what I wanted to do was very different to what is usually produced in this context.

Hesté: I also struggled to flesh out the focus of my research, so I started to talk through my views on multimodal imagery by making examples of the experiences I had through my professional Instagram account.

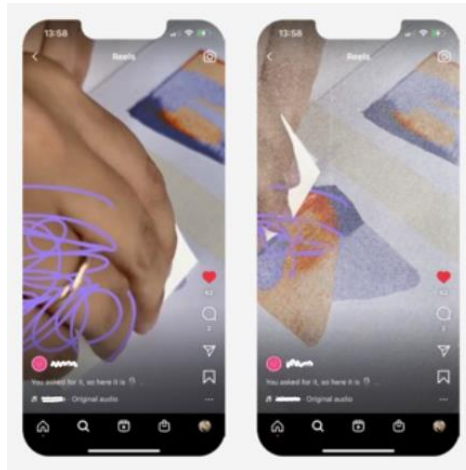


Figure 5: Hesté 2021, Instagram content creation

Karolien: What did you learn in doing this?

Hesté: So, ironically, I realised that social media lay at the heart of my research. As a freelance designer, I was frustrated by the homogeneity of most designers' Instagram accounts and was curious as to what I could do to stand out, to get more followers, and run a more successful business. I was interested in multimodal imagery because I wanted to believe that it could have potential to engage viewers more thoughtfully.

Karolien: This was a breakthrough moment for Hesté. It became clear how her *practice* (as designer on Instagram) could *lead* her research. It was now possible to connect the dots and arrive at a clear research plan.

Hesté: My research set out to explore how somaesthetic interaction design could facilitate more thoughtful engagement through and with Instagram. Methodologically, an autoethnographic approach was taken to firstly gain insight into how humans relate to sociodigital materials, specifically Instagram. Furthermore, the research involved continuous engagement in somaesthetic interaction design on Instagram to critically ascertain how it could negotiate more thoughtful engagement on the platform.

Karolien: A similar moment arrived for Kirsten through extending the reach of her design-based network by seeking out and attending a range of online seminars, conferences, and workshops that aligned with her specific design interest.

Kirsten: In one seminar, the speaker mentioned that the exhibition does not have to be an 'end'. They were attempting to communicate something important that they felt the public needed to know, and

thus used their exhibition to make this knowledge public. The speaker argued that the exhibition became part of the conversation of the research, opening new dialogues.

Karolien: I was so happy that this happened. It provided authoritative backing for the practice-led approach to design research I was advocating for. This experience allowed the puzzle pieces of Kirsten's research to fall into place.

Kirsten: I set out to explore the role that a critical, speculative kind of visual communication design practice could play in working towards a more sustainable (Fry 2020) future at SU. I firstly explored my own relationship to material, specifically trash, through design practice, then explored other humans' relationship with it; and lastly reflected on what visual communication design practice for more sustainable material futures could be.

Hesté: As part of the programme, we are expected to present our work at practical and theoretical seminars. This serves as a progress check and opportunity for feedback from the larger academic cohort. The theoretical seminars usually went well and were helpful as students and staff contribute to our understanding and scope of theoretical sources. What made the practical seminars different, though, is that we were expected to exhibit our practical work as an exercise for our final practical exam in an institutional gallery space.

My supervisor and I had many discussions leading up to my first practical seminar. We knew that my work constituted interaction design and was intended for Instagram, so we sought to come up with a solution to present this digital work in the designated physical space. I ended up placing QR codes linked to each Instagram post within the gallery space. This enabled my digital work to be experienced in a physical space, encouraging multimodal interaction.

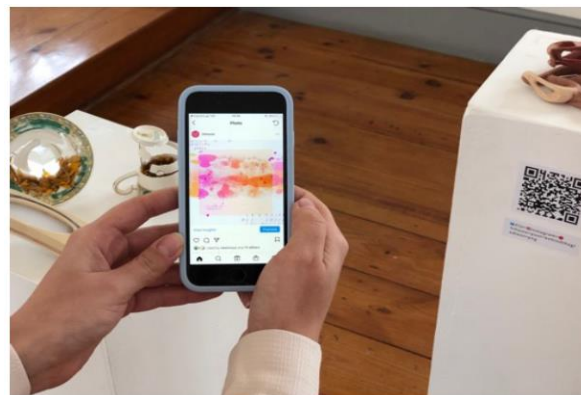


Figure 6: Hesté 2021, practical exhibition

Unfortunately, this was met with critical feedback. The feedback did not speak to what the work was trying to achieve – to its message – but was rather focused on the medium through which it functioned. It was extremely discouraging and allowed for increasing self-doubt. Why let me do my research within the broader field of design, if support is not there?

Kirsten: Our practical seminars at Gallery University Stellenbosch (GUS) were confusing for me too. The 'white cube' space tends to swallow design work. This, in combination with exhibiting our work with students from other disciplines, moulded my idea of what I should be producing to fit the space. I automatically compared my work to others' even though we followed different research processes.



Figure 7: Kirsten 2021, practical exhibition

Karolien: I found the practical seminars difficult too. Where the students were discouraged and left with feelings of self-doubt and loneliness, I experienced frustration. I mostly ended up justifying why the students' work didn't quite fit into the space it was being viewed in. This didn't feel constructive. I could see students' emotions rising during these sessions, and always jumped to organise a debriefing session soon afterwards to talk through their experiences. To be honest, I often suggested that they ignore the feedback received and continue the paths they were already on. While I have no doubt in the larger academic cohort's shared intention of supporting and facilitating all students' research journeys, the structure of the programme seems to resist the productive development of practice-led design research. It feels as if students' time, mental energy, and resources can be channelled more efficiently.

In an attempt to provide additional support, I initiated a Design Research working group with students. This provided a smaller-scale support system and more narrowly defined disciplinary community where knowledge sharing became easier.

Kirsten: Suddenly, it felt like I was in my element again, with people who understood me. We shared similar fears, had similar questions, and got stuck in similar places. It felt like I had people who could back me up and who knew where I was coming from, what I was trying to do, and how best to get there.

Karolien: I know that power lies in collaboration; in like-minded, networked community. I know that this lies at the heart of practice-led design research. But I also know that establishing productive networks and communities takes time, and that in the neoliberal context of higher education, time is generally in short supply. How can time be built into the structure of postgraduate design research programmes?

Kirsten: In the second year of my studies, I made use of a container space on campus to put up an interactive exhibition, *Trash Talks*. This became the heart of my research.



Figure 8: Kirsten 2022, interactive exhibition

Karolien: I encouraged Kirsten to do this from early on. It allowed her to consider how she could apply her work (of which a lot was quite speculative) in a way that would be accessible to a larger public audience. She also learned a lot through the process. It created an opportunity for receiving valuable feedback from her audience. This opportunity was extended by her establishing a social media presence for *Trash Talks*, thus allowing individuals to interact with the content in hybrid ways.

Below is an example of one of the speculative technologies Kirsten designed. The *Microviscopett* was designed from found materials and is intended to be used as a tool, allowing users to come to know everyday materials in newfound ways. She was curious as to the impact these kinds of imaginative tools could have in facilitating more critical acknowledgement of that which we usually take for granted.



cAn YoU SeE mE?

*L*ook through the Eye-hole of the *Microviscopett* and you may see something new in the *thing* you are interacting with.

Press the Eye-piece against your one eye whilst closing the other. Then point the device towards a matter that you would like to interact with.



*P*erhaps you will identify certain textures on your found material that you had not been able to see before...

Or perhaps you will see some magic

f l o a t i n g

between you.

Figures 9-10: Kirsten 2022, speculative design

Kirsten: I think it makes sense to think of practice-led design research as design initiatives. It shows our capacity to be change agents and allows our practice to function outside of the bubble that university can sometimes be, locating it in the real world. We can also take what we learned through the process of our studies – even the more intangible skills – wherever we go next.

Hesté: Yes! I never realised my master's would actually help me land a job abroad, but let me not digress [...] Figuring out how to ultimately present my work, especially the practical side of things, was a headache.

Karolien: The practice-led research existed in Hesté's professional Instagram account. It was documented in real-time as content was posted and responded to on the platform throughout the research process. The student did, however, synthesise and reflect on this in her thesis, which contained a range of visual excerpts and live links to the account. This document provided a comprehensive overview of the research process and could've sufficed as the integrated, final output for the degree, but the programme required an independent 'practical' exhibition over and above the thesis submission.

Hesté: My thesis was due a month before my practical exam. This does not make sense as the project is considered an integrated whole. I was, however, thankful for the extra time to prepare for the practical showcase since this received the most critique throughout the process. My supervisor and I both agreed that, as an integrated practice-led research project functioning in the context of interaction design on Instagram, the final body of work (even though multimodal) was not suited to physical exhibition format. I decided that doing an Instagram Live performance in my workspace, the space where I created the content posted to Instagram throughout the research process, could perhaps prove that digital content creation can be a valid form of design practice in a practice-led research context.

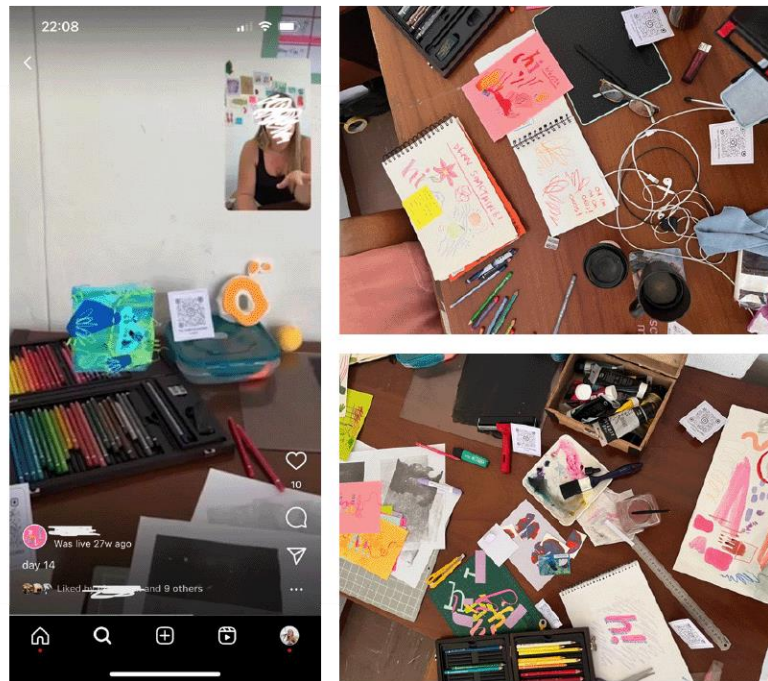


Figure 11: Hesté 2022, Instagram Live performance

I expected to do poorly due to the negative feedback received throughout, but, to my absolute surprise, I received an excellent result. This confirmed to me that practice-led design research does have value and can be well received when reviewed by those with specific knowledge in the field.

Karolien: As has been touched on earlier, there is power in numbers, and I believe we need to invest more in forging an active design research community (traversing the academy and industry) in our local South African context. This can hold value in supporting emerging designers, but also in showcasing the value design offers in broader South African society.

Kirsten: At the time of my last practical seminar, the public exhibition in the container space was running. I invited the MA cohort to visit this space before heading to the gallery for that afternoon's presentations. I did include aspects of my practice-led process work in the gallery to ensure that my work was represented there too. I was excited since I believed it would finally be possible for everyone to experience my work in the context in which it was intended to function. Unfortunately, very few people visited the container space prior to going to the gallery, and feedback was – once again – discouraging. I was disappointed. We are encouraged to exhibit outside of the gallery, but when we do, there is no time for people to go and view it.

Karolien: The world seems to be getting fuller and more complex by the second. Design functions in this world and must necessarily keep up. As design educators, it is our responsibility to provide our students with the skills they need to do this. But what are these skills and when and how do we share it? The current MA programme seems to struggle in effectively accommodating the variety of creative disciplines it houses. Despite the programme placing a high premise on integration, flexibility, and openness, characteristics in line with the general aim of postgraduate studies (i.e., of developing critical, independent thinking and problem-solving skills), design students often feel lost. I'm wondering whether it is not time to focus on more specific, specialised skills on postgraduate level? I'm wondering how postgraduate design education could be structured to allow specialisation, albeit in broader, transdisciplinary ways?

Kirsten: I got this far, and with the motivation from my supervisor, stuck to my guns. One thing I really did come to appreciate about the approach I followed was the inclusion of outside voices. It is necessary to think about how our designs are impacting the world and to work with a target audience who shapes the outcome. As has been emphasised by many designers and philosophers, designed *things* do not exist in isolation. Thus, when considering the outcomes of our projects, we need to consider what impact it may have on the community it is working with. Design research cannot take place in the comfort of one's home. So, to consolidate my work, I put together an interactive thesis document, reinstalled the public exhibition in the container space, and complemented this by showcasing everything that made up my practice-led research process within the Visual Arts Department. The examination panel started with the process work and was then directed outside towards the container. This allowed them to immerse themselves in my process and then experience being on campus in a similar way that the target audience of my research did.

[Examiner 1 2022] The honesty and incompleteness of this process work is what drew me as a reader and examiner even more closely into the journey that the candidate has travelled.

[Examiner 2 2022] The practical component [did] not simply illustrate the theory, as is often the case in integrated research projects, but here, praxis 'knot[ted]' the work – matter, concept, and method into a robust, vibrant, and entangled thing [that] opens up new lines of flight, thoughts and possibilities for [the] future.

Conclusion

In critically reflecting on our experiences of doing practice-led design research, we have come to realise that considering the structures necessary to support this form of research is crucial. In order to provide space and time to focus, we think a structured MA programme, including coursework and a mini research project makes sense. This could allow for focused training in practice-led design research skills. Contrary to conventional research methodology courses covering its historical development from quantitative, qualitative, to arts and/or practice-based approaches, we suggest that practice-led approaches are positioned first and foremost in the field of design. Practice-led design research training can be offered as a series of integrated (theory/practice) projects where students are guided through the principles of practice-led research through the application of their own practice to a selection of real-life, local case studies. How, for example, can communication design skills be used to negotiate specific cases dealing with environmental sustainability, economic development, digital technology, health education, etc.? In setting up such projects, a transdisciplinary network of collaborators could be forged in time, specifically within the larger institutional context and with immediate local industries. Simultaneous exposure to *specialised* design research skills *and* working as part of an extended *transdisciplinary* community – two things that might seem contradictory – might provide the support and focus that was missing in the case this paper reflected on. This pedagogical structure can highlight and position higher-order, 21st-century skills like design thinking, strategy, teamwork, creative direction, management, and entrepreneurship as central to the professional world by foregrounding it in and through practice, another aspect that Van Zyl and Naude (2019) have identified as lacking from South African higher education in design.

Such initial learning experiences should effectively direct a specific research focus and provide fertile ground and the necessary connections to conduct in-depth practice-led design research in applied, real-life contexts. The outcome of such research projects should be presented and submitted as a *single* integrated body of work. While the specific format should remain open, it must include a text-based narrative of the research process supported by whatever design-based media, objects,

experiences, prototypes and/or combinations thereof were relevant to the project at hand. We believe that, should this kind of structural support be in place, students would be able to function and learn more productively. It should enable a quicker graduate throughput and provide graduates with more tangible and specific industry-related value.

This research has provided a foundation for consequent research to build on. We aim to critically consider and explore the practical feasibility of restructuring the existing practice-based/led MA programme on offer at the Visual Arts Department at SU or designing and implementing a new programme in the next phase of this project. We trust that fellow design educators will be able to find value in our reflective work.

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Publish or parent: Reflective, creative work on the cost of parenting for female academics pre-, mid- and post- the COVID-19 pandemic

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Abstract

Despite the change over time in academia's gender profile, educationalists Bradley and Oldham (2020) challenge what they perceive to be the perpetuation of "gendered norms of productivity and the mythical notion of work-life balance". Bradley and Oldham (2020) argue that these concepts "endlessly complicate the conceptualisation and operationalisation of the female academic's success" and take the position that "[w]omen cannot give in to this concept of two separate worlds, which splinters the self". They propose a reflective practice that prompts female academics to "claim our entire personhood, professional and parent if we are to seek freedom from feeling 'torn' between these spheres".

As a mother, and in response to my sense of feeling 'splintered' and 'torn' between parental, personal and institutional measures of success, I created a series of artefacts that recognise my personhood as a professional and a parent, consciously trying to repair the divide between these two spheres of my identity. This work was displayed in 2022 as part of a group exhibition at the University of Johannesburg FADA Gallery. I created three densely designed aprons and a tablecloth imprinted with text and imagery extracted from to-do lists in notebooks – from 2019 to 2022 – and drawings by myself and my young daughter. The lists were a reflective record of pre-pandemic, pandemic, and post-pandemic times and proved poignant and sobering. In addition to the realities of parenting from home, they encapsulated exhausting 'invisible' professional responsibilities, such as supporting first-generation university students, departmental housekeeping, community engagement, extensive teaching hours within an under-staffed department and some dogged attempts to find focused time to engage in research. The printed artefacts were displayed in conjunction with 3D 'creative outputs' constructed with my daughter. Viewed as a whole, the installation evoked the struggles experienced by academic mothers worldwide when two separate identities, academic and parent, were unexpectedly forced to fill the same space during the COVID-19 pandemic.

As an extension and explication of the gallery installation, this paper explores the challenges of female academics who are also mothers and who argue for a more empathetic perspective on the impact of hybrid teaching during the COVID-19 pandemic. I reflect on my creative output and my personal experience as a dedicated mother, academic, teacher, and partner of a medical practitioner who is a frontline worker. Whereas recent international studies primarily focus on the roles and expectations of female academics during the COVID-19 pandemic, my contribution sets out to engage with this conversation specifically from a South African design lecturer's point of view within the incredibly

harsh South African lockdown. It provides insights from my creative work concerning greater inclusivity and support within academia.

Keywords: Auto-ethnography, gendered workspace, invisible work, multimodal identities, practice-based research.

Cutting the cloth

The precarious balance between parenthood and academia is not a new concern: as far back as 2009, Hirakata and Daniluk reflected on the struggles of academic mothers with young children. The research team identified a conflict between family and work as the main reason for the poor retention of female academics (Hirakata et al. 2009, p. 284). Hirakata et al. (2009, p. 284) indicated that female academics with children publish less research, impacting promotion opportunities.

More recently, Bowyer et al. (2021, p. 311) reiterate that, compared to childless and male colleagues, "academic mothers suffer far more difficulties in their bid to juggle family and parenting commitments with a broad range of academic work across teaching, research, and service". Bradley and Oldham (2020, p. 86) highlight that these gendered disparities in research performance, measured by publications and grants, are further impacted by "teaching and mentoring, service loads and gendered division of labour within households". This 'invisible service work' refers to marketing, participating in industry events, competition entries, and offering support and care work to students and colleagues. According to Bird, Litt and Wang (2004, p. 230), invisible service work hampers promotion opportunities and "faculty who devote considerable time to service work are likely penalised in their efforts to achieve tenure and promotion". Magoqwana et al. (2020, p. 11) argue that, within neo-liberal South African universities that focus on research outputs and throughput rates, there is more pressure on female than male staff members to provide care and service work for "customers" to improve throughput.

Following a 2007 study on South African academic mothers, Pillay (2012, p. 142) concluded that a balance between the two identities of a mother and an academic is impossible. Pillay (2012, p. 142) posits that "motherhood appears to imply feelings of guilt [...] [that are] externally created and perpetuated as well as internally reinforced". Participants in Pillay's study could only achieve a semblance of balance through a division of physical spaces, clearly allocated blocked-off time or even a debriefing activity – such as driving home – between the two roles of mother and academic (Pillay 2012, p. 146).

This conflict between an academic career, invisible service work and motherhood became even more pronounced in the first quarter of 2020 with the advent of the COVID-19 pandemic. During the COVID-19 lockdowns, separation by time and space became impossible, forcing academic mothers to work later into the night to handle increased work responsibilities (Kriger 2022, p. 145); these experiences were well-documented, nationally and internationally (Bowyer et al. 2021, Walters et al. 2022, Kriger et al. 2022, Okeke-Uzodike 2021, Makhura 2022, Pereira 2021, Ciu 2021).

In April 2020, after a brief hiatus in response to a world brought to a sudden lockdown, my university, department, and I set to work. The goal was simple: Assist all students, no matter their circumstances, to participate and succeed in the academic programme. Practical contact classes moved online immediately. We became cloistered in our houses, joined by our families. My university requested reams of data at short notice, expecting instant responses on students' connectivity, technical ability, home-life situations, and participation in the programme. My colleagues and I worked day and night, coming to grips with online teaching, attending online meetings, writing reports, uplifting fellow staff

members, and following up on deeply anxious and missing students. The strain was compounded by caring for my daughter – often on my own – cooking, cleaning, and navigating an uncertain present and future as my partner risked his health as a frontline medical practitioner. Bowyer et al. (2021, p. 331) affirm that this "rapid transition to online learning, coupled with school shutdowns, created a double shift for many women whereby academic and family responsibilities not only increased but had to be met simultaneously. As teaching and service loads increased exponentially alongside our caring roles, it was very much the research elements of our careers that suffered".

Walters et al. (2022, p. 143) administered an online questionnaire and open-ended narrative account of home life during the 2020 lockdown, from 1 July to 30 September, to 2 018 female academics at 26 South African Universities. Since the results of this collaborative project indicated that having young children at home was the most important variable affecting the academic work of mothers during the lockdown, Kriger (2022, p. 143) drafted a paper, based on this data, that specifically addresses responses from female academics with preschool children. The most striking finding was that "(h)aving young children at home had a direct influence on the levels of stress and the availability of working time for the participants in this study" (Kriger 2022, p. 145).

This finding validated my sense of two separate identities, academic and mother, unexpectedly forced to fill the same space, as experienced by academic mothers worldwide. In 2022, contact classes resumed as if past efforts had not happened. Internationally, there had been an increase in research productivity overall but a clear decrease in female-authored papers (Ciu et al. 2021, p. 3).

After two tumultuous, unbalanced years, I researched national and international studies on academic motherhood to deal with my sense of fragmentation. Inspired by the findings of fellow academics, I created a series of artefacts that recognise my personhood as a professional and a parent, consciously trying to repair the divide between these two spheres of my identity. This installation was displayed in 2022 as part of a group exhibition at the University of Johannesburg FADA Gallery. When writing my artist statement (Maart 2022, pp. 130-131), I could, therefore, align my subjective, creative work with national and international studies on academic motherhood during 2020 and 2021.

Artist's statement: *Voorskoot*¹

In response to my sense of feeling 'splintered' and 'torn' between parental, personal and institutional measures of success, in an act that recognises both my personhood as a professional and a parent by repairing the divide between these spheres of my identity, I created a series of three densely designed aprons and a table cloth from accumulated to-do lists and sketches by myself and my daughter taken from my notebooks from 2019 to 2022. 'Voorskoot' is the Afrikaans translation for an apron. These aprons are exhibited along with other relevant artefacts and a range of 'creative outputs' by myself and my daughter. The work serves as a "reflective checklist" (Bradley & Oldham 2020), visualising the choices, priorities, so-called invisible work and engagements in the many worlds I traverse daily as a parent, partner, professional and academic. Like an apron, these roles are worn, sullied, removed,

¹ *Voorskoot*: Afrikaans for 'apron'. The term, in Afrikaans, literally means 'something that is placed in front of the lap'. The traditional definition of *voorskoot* in the *Verklarende Afrikaanse Woordeboek* (Kritzinger, Labuschagne & De Villiers Pienaar 1959, p. 737) reads as follows: [*L*]os oorkleed wat dames veral voorhang om hulle klere tuis teen vuiligheid te beskerm (Loose overgarment that especially ladies hang in front to protect their clothing from dirt in the home). Reference to gender and domesticity is absent in the current Wikipedia definition of the Afrikaans term (Voorskoot 2021). Still, the image demonstrating the garment's usage depicts two dames (ladies) working in a kitchen. Kritzinger et al. (1959, p. 573) note that *skoot* can also signify the womb. Thus, the term *voorskoot* is saturated with references to female domesticity.

washed, and then again hung on the wall, ready for another day of service. An apron is used to protect, keep clean, and take on a role.

By incorporating my to-do lists, the main method to help me remember tasks and expectations, I show there is little balance or separation between the home and the career of an academic mother. As a mother, one is everything to everyone and little to oneself. The aprons symbolise the roles and layers one has to assume as a parent and academic, leaving little to no space for other pursuits. My numerous to-do lists from the past years, spanning pre-pandemic, pandemic and post-pandemic, proved quite poignant and sobering. The lists encapsulated, along with parenting from home, a long list of so-called 'invisible work' such as student applicant portfolio reviews and departmental marketing tasks, service work such as mentoring and supporting struggling first-generation university students, departmental housekeeping and administration, extensive teaching hours within an under-staffed department and dogged attempts to find some focused time to do research.

During the COVID-19 lockdowns, I often felt like the boundaries between my many roles had been destroyed, with expectations that I teach online, whilst in an online meeting, whilst trying to take care of a young child who does not understand why I am ignoring her. Our university's Psychological office attempted to give struggling staff counselling, but this was pointless as the problem was not emotional or mental but unable to take on many different roles simultaneously. At the end of one institutional questionnaire to find out how the university's psychological services could help, I had to conclude that nothing might lighten these many burdens except at least recognition of the difficulties academic mothers experienced and the impact this has had on our career trajectories. I created a tablecloth and aprons from my lists because of this experience to show that my (and many other colleagues') service and care work protected my child, department and students but felt invisible and taken for granted by university management and society.

The 'creative outputs' on display symbolise the time-consuming role of a parent in trying to create an enriched life for a child. I have placed them on a low plinth so the viewer has to look down on them. It often feels that even having a child, much less spending time bringing up said child, is generally looked down upon by neo-liberal university management. According to Bowyer (2021), "academic mothers suffer far more difficulties in their bid to juggle family and parenting commitments with a broad range of academic work across teaching, research, and service than their male and non-parenting counterparts". However, each humble little work on this plinth symbolises value, love and care in developing a young mind. No one but myself and my daughter may appreciate its meaning, but it is ours.

Stitching the cloth

I applied practice-led research and the aesthetico-action research cycle as the basis of my methodology when crafting this exegesis of my 2022 creative output, *Voorskoot*. According to Marshall (2010, p. 78), "reflexive practice is characterised by the thoughtful coming together of critical reflections and actions that bring to light or mirror the underpinnings in our practice concerning our assumptions, biases, and perspectives". An exegesis, or critical interpretation, is the written component of a visual arts enquiry, which takes shape in conjunction with the creative output (Marshall 2010, p. 78). This paper and my 2022 artist's statement above provide the context for the installation and situate it within a greater body of research, namely Critical Feminist Theory.

Rust et al. (2007, p. 11), in *Practice-led research in art, design and architecture*, define Practice-led research as an original investigation undertaken to gain new knowledge partly employing creative practice and the outcomes of that practice. Rust et al. (2007, p. 10) state that "practice-led, does not describe a single set of ideas about research. Its meaning varies with discipline, location, and person and it varies with the questions that are investigated".

The Aesthetico-Action Research Cycle entails four consecutive stages, namely Observation, Reflection, Planning, and Action, before the cycle restarts (Marshall 2010, p. 81). My Observation entailed gathering and analysing my notebooks and individual experiences and reviewing relevant literature. This initial formative stage preceded my reflection on the literature, documentation and lived experiences in my artist statement. The third stage, Planning, consisted of reviewing all the visual data from my notebooks and creative outputs made with my daughter through the lens of the literature review to propose feasible creative methods that best encapsulate my argument, namely that there is no perfect balance between an academic career and motherhood and that this precarious imbalance was severely disrupted during the COVID-19 pandemic. This step preceded the Action of creating the output. After its creation and setup, the creative output was again Observed, Reflected on (by the artist, reviewers and viewers), followed by Planning for the textual output or exegesis, written up as the next Action in a retrospective analysis (Marshall 2010, p. 81).

I link my installation with the feminist guiding principle that ‘the personal is political’. Rogan et al. (2018, p. 132) summarise this Second Wave feminist principle, first coined by Hanish in an essay by the same title in 1970, as:

A product of patriarchal power relations [that] extended the definition of politics to areas of everyday life formerly trivialised and understood as natural, [and thus] challenged conventional norms that defined political action [...] that allowed women to discover the political nature of their experiences as the foundation for activism.

The feminist principle ‘the personal is political’, quoted from Harris and Gonzales (2017, p. 4) in Magoqwana et al. (2020, p. 9) encourages women and other marginalised groups to speak out, as “personal stories are symptomatic of a larger structural problem and thus well placed to facilitate broader political discussion”. Thus, my personal experience, encapsulated in my notebooks and creative tasks with my daughter, as confirmed by the data collected by the studies listed above, takes on a feminist political lens.

Crafting *Voorskoot* (2022)

I started the creative project by reviewing my three notebooks from 2019 until mid-2022. I take these A5 books everywhere during my multi-faceted day to take notes of meetings, draft a bi-weekly to-do list, write observations, and draw patterns, objects and calming mandalas. I often revisit the patterns and mandalas until they cover a full page, as drawing helps me focus during long and complicated meetings. However, my notebooks are not fully mine alone, as my daughter has, since the age of about 3, been stealing them at first and later asking for them outright to draw during times waiting for appointments, boredom or even just whilst travelling with me by car. As such, my notebooks also contain a timeline of her creative development, from rough mark-making (Figure 1) to loose and, of late, more developed figures from her life and imagination (Figure 2).

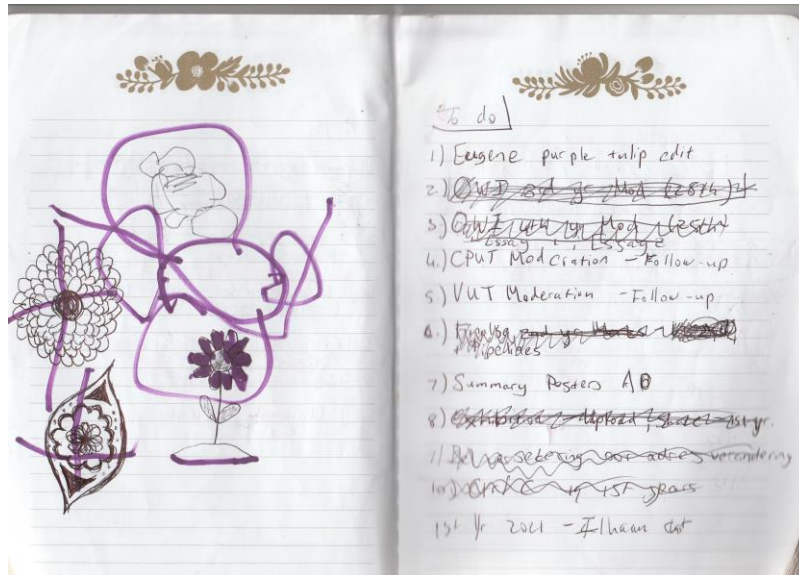


Figure 1: Double-page spread, artist's notebook, August 2020, collection of the artist

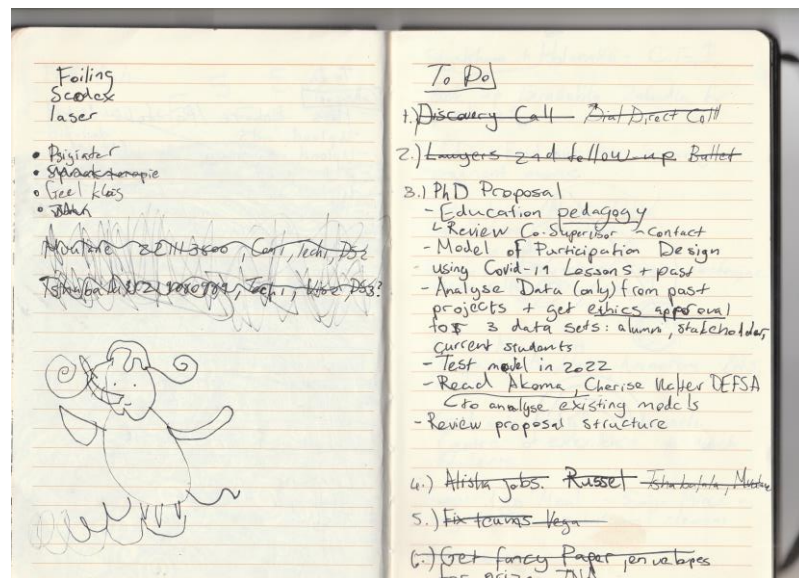


Figure 2: Double-page spread, artist's notebook, November 2021, collection of the artist

After reviewing the content from the three books, I scanned all the pages. The coloured scans were placed in three square grid layouts, one per year, of 62.5mm x 62.5 mm blocks on a 1.7 x 1.3-metre page on InDesign. For ethical reasons, when arranging these images, I took special care to crop out any personal information, phone numbers or identifiers of students, friends, or colleagues. After selecting an appropriate rough-textured fabric to print the design, I sent the three layouts to a digital fabric printer, Dunamis Textile Printers. The printed material was used to make up three aprons (Figure 5) and, with the assistance of Nhantsike Apparel, based in Westdene, Johannesburg, the remaining fabric was combined into a three-panelled tablecloth (Figures 3, 4 and 5). Simple wooden pegs from which to suspend the aprons were chosen to match the overall nature of the exhibition, with a focus on natural, homely materials.

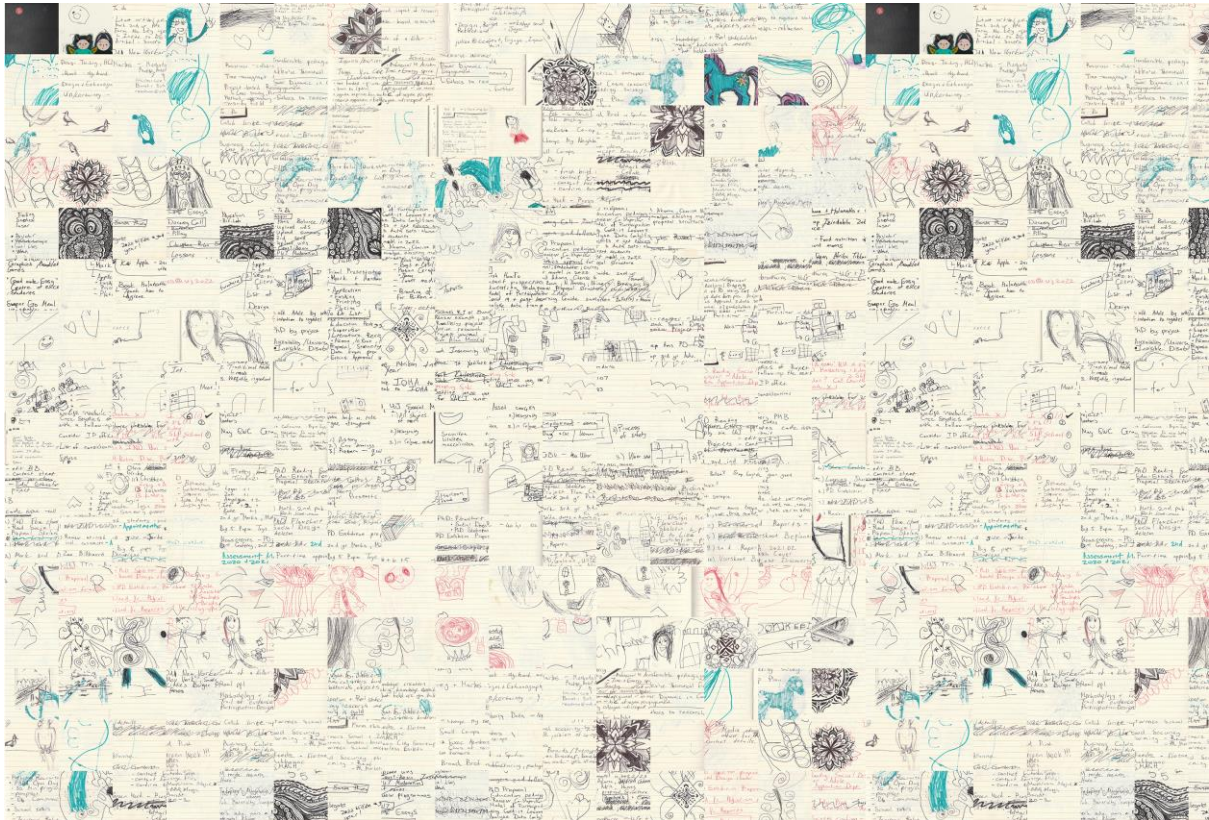


Figure 3: The 2021 layout, document in the writer's possession

I reviewed my and my daughter's crafting projects scattered throughout our home to identify appropriate projects for the exhibition installation, which was curated as a final work by the gallery's curator and a colleague with knowledge of the project.



Figure 4: Three close-ups of the tablecloth and creative outputs, photos by Sarah de Pina 2022



Figure 5: The final setup of *Voorskoot*, photo by Sarah de Pina 2022

The final installation (Figure 5) also included the three original worn notebooks inserted in the pockets of the hanging aprons, although viewers were not encouraged to interact with the books. Each strip of fabric was aligned with its apron and notebook on display. The creative pieces were randomly scattered across the tablecloth.

Die tafeldoek

Understanding my work wearing my apron of motherhood

The Social Sciences Feminist Network Research Interest Group (SSFNRI Group), based at Humboldt State, California, USA (2017, p. 231), states that, along with invisible service work within the academy, women usually do more invisible work within their homes. Academic mothers have had to adjust their work programme according to that of their children, limiting research time. The group concludes that this illustrates that academic women who have families are thus double penalised (SSFNRI Group 2017, p. 231). As mentioned, all tertiary education programmes were thrown in disarray during the pandemic, with teaching and childcare, and after-hours administration and student care work becoming my more crucial work. Mirick and Wladkowski (2018, p. 264) state that within academia, there is a general institutional attitude that the role of motherhood is secondary to academic careers and that academic mothers are discouraged from speaking about their roles as mothers and how it interferes with their jobs.

Thus, the 'creative outputs' on display symbolise the time-consuming role of a parent in trying to create an enriched life for a child. I placed them on a low plinth so the viewer has to look down on

them, as it often feels to me that the act of even having a child, much less spending time bringing up said child, is generally looked down upon by neo-liberal university management. However, each humble little work on this plinth symbolises value, love, and care in developing a young mind. No one but my daughter and I may appreciate its value, but it represents precious time spent together, which, in retrospect, I view as a calm space of creativity and growth in a world gone mad.

Understanding my work through the eye of the needle of academia

The process of creating this installation proved to be quite empowering. My literature review before creating the work, my portfolio of evidence on display and the further research conducted for this paper gave me a sense of vindication. The experience of my boundaries being torn and frayed from working from home while caring for my child and students was a terrifying experience that occasionally gives me flashbacks of anxiety and frustration. In order to have this confirmed by other academics in their qualitative studies and by further quantitative studies came as a relief. However, this confirmation also adds sadness for time lost and time with my child not being appreciated by myself.

Understanding my work as an invisible tablecloth

I created a tablecloth and aprons from my lists because of this experience to show that my and many other colleagues' service and care work protected my child, department and students but was invisible and taken for granted. According to the SSFNRI Group (2017, p. 229), female academics often do the necessary but invisible labour, such as student care work, administrative tasks, meetings and social events, which are 'coded feminine' and less valued than research publications and grants. Teaching is a personal passion of mine, and within a South African context, it is crucial and presumed to a university's purpose. However, according to the SSFNRI Group, teaching has become another form of invisible work that does not carry the same weight as research for promotions (SFNRI Group 2017, p. 236).

Understanding my work based on the expectations of others

Academic visual artist and curator Brenton Maart (2022, p. 11) writes within the exhibition catalogue that my work presents a complex amalgamation of positionalities from which I interrogate the "personal" and the "professional". He refers to the split in my roles and demands on me as an academic, mother, teacher, and invisible service worker as near-schizophrenic and a false dichotomy.

During discussions on the piece's development, my female and male colleagues with children proved very supportive and open to discussion. After the exhibition opened, only other academic mothers responded to my installation and came to discuss the piece with me. The response from other academic mothers proved positive and uplifting. One colleague approached me after the opening to tell me how touched she was by my work's effort to expose the extreme limits academic mothers were pushed to during the recent pandemic to try and nurture our families and students.

Oppedoek

I planned for this piece to record my experience, but the installation became a feminist statement. For this reason, I chose the title, *Voorskoot*, and the other headings within this paper to link to the idea of the Afrikaans homemaker and mother. However, in doing my invisible work of caring, mothering, creating with my daughter, mentoring students and finding opportunities, I protest the expectation of work/life balance. Based on the reams of academic papers on this subject, this only confirms the need for change. One is not born an academic, and one is not born a mother. Both roles are learned and

grown into. I find it easy to care for my child, my students, my department, and my institution, as I believe in the validity of each. However, this ease of caring can cost me my identity, especially when the boundaries between my roles are torn as they have been during the pandemic.

As Bradley and Oldham (2020, p. 92) conclude, I must continue facing my many roles with “the knowledge that work-life balance is a myth, gender inequities exist, and that the world of academia can change and needs to change”.

Creating the overall work proved cathartic and has guided me to say 'no' more. However, students and faculty still attempt to intrude on my boundaries physically, emotionally and after hours. There is still an expectation after the COVID-19 pandemic that I must be available 24 hours a day. This pastoral work will form the basis of my next creative output, based on 'invisible work'. This output will add another cycle to my aesthetico-action research methodology.

As I migrate between my roles, I constantly remind myself of my boundaries, a fine, invisible line now permanently drawn in my consciousness. As academic mothers, do we make peace with our lot, or is the engaged discussion a way to create greater awareness?

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SESSION 3: Learning





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Celebrating Afrikanness: Proposing a design approach that foregrounds Afrikan cultural identity and Afronowism

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Abstract

Starting in the 1990s in South Africa, according to Sauthoff, designers in general and graphic designers in particular have sought to create an inimitable design style that is imbued with a recognisable (South) Afrikan cultural identity. This is in reaction to the entrenched hegemonic influence of Euro-American design practices. Names like Saki Mafundikwa, Karabo Poppy, Garth Walker, and Sindiso Nyoni are on the influential list of designers bracketing a so-called African design aesthetic. How is this 'aesthetic' related to design that is culturally significant, according to Twigger Holroyd, and that lends authenticity to an artefact, positioning it as representative of Afrikanness?

This paper considers whether the notions of Afrikanness in design can be included in the learning and teaching processes of graphic design. The intention is not to suggest that there is a formulaic approach to designing that results in an Afrikan 'feel'. Rather, that the methodology employs Afronowism as an attitude to design that considers several ways of knowing Afrikanness, and consequently, embedding that in ways of doing. This is achieved by seeking to identify the 'essence' of cultural identity that embodies an Afrikan sensibility and acknowledges cultural diversity.

The methodology includes a multivalent approach that uses Rose's "Visual Methodologies", Hall's "negotiated reading", and Pauwel's arguments for visual analysis and selective sampling that recognise the importance of the author/designer's subjectivity in understanding the sample and analysing it. The findings allow for the development of criteria, which can then be used as a teaching strategy for a design brief and engage in a design process that is culturally sensitive, ethically aware, and humanistic. Together with visual and cultural studies, this approach to designing artefacts and visual communication creates a space of criticality and questioning for students that centres on recognition of the diverse aspects of visual culture underpinning Afrikanness. Although, in this paper, graphic design and visual communication are posited as the vehicles of learning, the methodology was conceived with broader design disciplines in mind and so serves all streams as a method.

Keywords: Afrikanness, Afronowism, graphic design, learning and teaching approach, visual methodology.

Introduction

"Afrikan aesthetic", "African style", "Afrikan sensibility", "Afrikan cultural identity", "authenticity" are all buzz phrases used to describe the elusive and unpindownable quality of "Afrikanness" that

continental Afrikan designers seek to imbue their designs with. This is frequently coupled with globalisation thinking and Afronowist¹ (Cadle 2020; 2022) design approaches, to capture the essence of that which is contemporary, signifiers of a modern Afrikan attitude. Design is a visual language that communicates meaning through a combination of characteristics; by the way that it looks, aesthetics, its affordances, textually, sonically, texturally, all towards persuasive intent and user-centricity. A design methodology based on Afronowism introduces ways of thinking to students that lead them to consider Afrikanness and the representation thereof more consciously. Consequently, this paper addresses the graphic design learning and teaching circumstance as it pertains to the representation of Afrikanness conceptually and physically and suggests a series of steps that can be followed by a student (or professional designer) to achieve this outcome. Once the relationship between Afrikanness and Afronowism is understood, a range of analytical approaches are recommended, each with their own criteria, that scaffold to illuminate how one could design towards an outcome that reflects Afrikanness.

Creating context for the Afrikanness argument

At the outset it is important to acknowledge that the distinction between graphic design as visual communication and designed artefact, and other design fields, lies largely in whether text, and hence language, is a constructed component of the communication or artefact. This resonates with Ngũgĩ's (1986) view that Afrikan language, history, and cultural identity are intertwined, and meaning in visual communication is given a more local context when text is incorporated, adding idiom, nuance, colloquial flavour and so on. However, as some designers will attest, in some instances words, no matter their language, function as design elements in a visual communication space. East African *Kanga* cloths (Figure 1) are a good example of this, where the aphorism, or *jina*, printed in capital Roman letters on the cloth, is integral to the design, even though the reader may not be familiar with Swahili or Sheng as language (Birch & Lutomia 2016, p. 40).



Figure 1. *Kanga* (n.d.), “the user of the brother remains poor” (Image: Cadle 2021)

¹ “Afronowism” is a way of thinking in the present, imagining future possibilities and practising socially engaged design with cultural significance, which reflects continental Afrikan voices, values, knowledge, and aspirations. I have discussed this concept in two previous articles, see Cadle (2020) and Cadle (2022), and here offer my encompassing definition of the word.

The point of this inclusion is to highlight two notions; text and language are intrinsic components of graphic design communication (although other design fields sometimes use text as pattern-based visual element or as in the case above, as aphorism, or as branding tag); often not being able to decipher the text does not diminish the signification or aesthetic value of the visual communication or artefact. The suggestion in this realisation is therefore that if there is a determinant for Afrikaness in graphic design, which it would apply also to other fields of design as creative practice.

Since the idea of decoloniality gained traction, especially in the last 30 years in South Africa, the desire to inflect Afrikaness in design has been attempted by several noteworthy designers of the era. Already in 2004, Sauthoff and Sutherland drew attention to the pressing issues relating to South African design (and hence Afrikan design) as it related to design development and “its reactive relation to unique cultural, social, and economic circumstances in both historical and contemporary contexts” (Sauthoff & Sutherland 2004, p. 3). Cultural variety and understanding the value of indigenous knowledge and issues of inclusivity are identified as crucial to design education. Oguamanam (2006, p. 376) defines indigenous or traditional knowledge as “culturally coded knowledge produced, shared, and recreated among an identity group as an aspect of the cultural dynamic of its practitioners”. Cultural issues and these repositories of knowledge figure strongly in the determinant of ways of knowing. “Afrikan knowledges’ aetiologies being deeply entrenched in cultural histories [allowing Afrikan designers to mine] these rich knowledge sources, merging them with a contemporary design ethos and an abiding skill in imbuing their work with an essence of Afrikaness” (Cadle 2022, p. 32). So to, do the ideas on Afrikan aesthetics, and the vocabularies that explain their semantic range, engage with ways of knowing, like Afrikan ontologies built from “proverbs, poems, stories, legends and myths” (Van Damme 2000, p. 9-10).

Somé (1992) notes that the aesthetic in sub-Saharan Afrikan cultures is of philosophical interest as it is informed by these culture-specific vocabularies. Of interest is the observation by Ibanga (2017) that there is often dialogue with the Western aesthetic tradition. These are important considerations when contemplating Afrikaness as they support ideas on cultural hybridity. Cadle (2022, p. 37) concurs:

Central to this is recognition that Afrikaness and Afro-now-ism is about ownership of the culture, products, and practices, even as many of them are hybrids of their ancient and traditional selves, the consequence of colonial era atavism. Importantly, modern Afrikans of the post-colony have incorporated many of these influences into their notions of tradition and cultural relevance in the current era.

The ideas on cultural hybridity and hybridisation deserve discussion as both draw Afrikaness into a space that suggests one not only looks to the past for a ‘traditional’ Afrikan aesthetic, style, sensitivity, cultural identity, and authenticity but also considers how cosmopolitanism, global issues, and design culture are affective in the present. According to Julier (2014, p. 157), Zukin (1991) “contends that the new middle classes of global disorganised capitalism² (Oxford Reference 2023) exercise cosmopolitan tastes as a vehicle of their cultural capital”. This is fed by a convergence of the media industries and technologies [of dissemination, social media, streaming and the ubiquity of virtual environments] that integrate into people’s lives across [cultural] and geographic boundaries (Sturken & Cartwright 2001, p. 315). It should not be lost, in the Afrikan context of this paper, that “cultural hybridisation” is an inevitable consequence of this; “Cultural responses [...] range from assimilation, through forms of separation, to hybrids that destabilise and blur cultural boundaries” (Pieterse 1995 in Barker 2013, p.

² In the modern era, due to the demise of full-time employment, employment inequality, the growth of service industries and the informal sector, and post-modern culture it is alleged that the structures of capital (corporations) and labour (trade unions) have broken down – this is termed “disorganised capitalism”.

264) allowing opportunity for cultural differences and similarities to co-exist, and for the production of new identities and cultural forms (Barker 2013, p. 265). As a result, hybrid Afrikan cultural identity becomes a criterion for understanding Afrikaness and presents possibilities for the design (and reading) of hybrid artefacts.

To reiterate, the analytical methods proposed in my 2022 argument (Cadle 2022), when collectively applied through my critical lens, and worldview, provide an effective reading of what could be considered Afrikaness in a designed artefact. Performing this process, however, requires that the researcher be familiar with the epistemologies influencing the reading, has significant experience with various models employed in visual analysis (semiotics, formal analysis, critical reflection, discourse analysis, negotiation), uses suitable samples and is able to validate the findings or reading. Developing a system that could be used by learners of design and graphic design, that is less complex and does not depend so heavily on lengthy lived experience is the desirable outcome. Understanding that “material objects, things, and substances come to have social resonance” (Drazin 2021, p. 74-75) is central to how it invokes Afrikaness. “Design comprises a professional and popular discourse by which people appreciate, approach, evaluate, and work with material things” (ibid.). The subjective nature of the aforementioned is an unavoidable tenet of visual analysis as a research approach and method. According to Sturken and Cartwright (2001, p. 57), the conscious and unconscious come into play when attempting to decipher an image and depends on dominant ideologies and meanings, memory, knowledge and experiences, and cultural influences. The image or artefact itself carries embedded dominant meanings and so negotiating meaning is an active process of decoding the design as opposed to a passive receipt thereof.

A pragmatic analysis tool

The proposition of an analytical tool to measure or identify Afrikaness begins with a design brief that sets *Afrikaness* as not only a practice outcome but as its conceptual underpinning. An important aspect of this process is that it attempts to predict or project the outcome of a design brief's Afrikaness rather than reflect on the design afterwards to establish whether the Afrikaness is characteristic of the resultant artefact. Several interconnected analytical approaches and methods are proposed to guide the learning and teaching processes of students of graphic design, enabling creative production that resonates with Afrikaness and Afronowism. Central to the visual analysis models proposed is the inherently subjective nature of the readings. There is similarity with discourse analysis in these methods, where the validation of the readings emerges from synchronous themes, codes, and signifiers. The analysis approaches and methods of reading for meaning are discussed below in the sequence in which they are applied to the artefact designed by the student, according to the “Afrikaness brief”, and to the design samples used to validate the design decisions.

Pauwels' visual method and selective sampling

Luc Pauwels (2020, p. 5) avers that the study of visual material provides “insight into the social functions of the cultural product”, the values, norms, beliefs and heritage of a society, as well as being a gateway to understanding the culture of its creator and the intended audience thereof. The visual material in this case would encompass that produced by the researcher/designer (the emic perspective), allowing for reflexivity, and read against pre-existing, or found, materials that are considered definitive or dominant signifiers of the culture (the etic perspective) (Pauwels 2020). For this exercise “Expressive/creative visual production (with [a] communicative end)” (Pauwels 2020, p. 24) is the desired outcome to be ‘measured’ against a selective sample of visual material based on relevant variables like content, style, era, author, audience or others (Cadle 2022, p. 35).

The design brief should encapsulate the Afronowist ideal and the focus on Afrikanness as an essential element of the outcome. This should then inform the development of criteria, by the student designer, to determine the selective sample, the characteristics of which should guide the design of the artefact or visual communication through a process of reflexivity.

Cadle (2022, pp. 35-36) puts forward that some of these criteria could be (these are edited to suit the tone of this paper):

- Is the design imbued with the character of an Afrikan stereotype?
- Does the design reference artefacts that are sourced from Afrika-based traders, artists, crafters, designers, or manufacturers?
- Is the artefact traceable to Afrikan production?
- Does the artefact have cultural significance where it expresses social value, historical value, or aesthetic value, according to Twigger Holroyd (2017)?
- Is the artefact found or used in Afrikan rituals, tradition, or ceremonies, and is it respectful of heritage?
- Does the artefact reflect a hybrid African cultural identity? (This criterion is newly introduced by this author as an evolution of the above five points).

These criteria serve as either inspiration to inform the design process, or as filters to exclude that which is inappropriate to the Afrikanness brief requirements. As the work of Karabo Poppy, Saki Mafunkidwe, Garth Walker, and Sindiso Nyoni is considered to be definitive of that which is Afrikan, in a contemporary sense, Pauwels' approach could include them in the sample selection. They could be subjected to the critical criteria of the flow process in Figure 2 to determine whether the characteristics derived therefrom, indeed define their work as meeting the "Afrikanness" requirement.

Cultural significance

De Rijk (in Van Boeijen and Zijlstra 2020:7) states that "Design is a profoundly cultural activity which encourages a positive contribution to the inescapable changes in the world". It is a designer's role to consider the impact of their work on the present and the future, and the changes this may induce. They should be sensitive to and understanding of these implications when cultural knowledge is involved. Amy Twigger Holroyd (2017) terms this phenomenon "cultural significance" and offers advice on how this can be determined or employed. Said designed artefacts or visual communication should be read according to their social, historical and aesthetic values. Cadle (2022, p. 35) after Twigger Holroyd explains these values:

'Social value' refers to the associations that a design, product, or practice has for a particular cultural group and the social, cultural, or spiritual meanings that it holds for them. Social value may reflect a sense of identity, distinctiveness, and social interaction. 'Historical value' derives from the ways in which aspects of life from the past can be connected to the present through designs, products, and practices. It may be based on the length of time a tradition has developed, its association with specific people or events, or its rarity or uniqueness. 'Aesthetic value' refers to the visual, sensory, and perceptual experience of a design, product, or practice. It includes artefacts and patterns with uncommonly attractive or distinctive qualities that evoke strong feelings or special meanings.

Van Boeijen and Zijlstra (2020, p. 7) caution that the "culture" should not be seen in a reductionist way, as a catalogue of different, defining design styles, but rather as cultural diversity dynamically responding to continuously changing circumstances.

Gillian Rose on visual methodology

When considering how to proceed with the analysis of visual material, in this case designed artefacts and visual communication, Rose (2016) offers sane and valuable direction regarding methods.

Three issues emerge regarding the purview of this paper and how its findings impact on practice in a learning and teaching environment:

1. The design brief requires that a student, in the pursuit of the requisite outcome, should align their ideation and design response to Afronowism as a guiding principle and that Afrikanness be an embedded quality. Here, the brief can be for any category of design within graphic design – corporate identity, branding and retail, packaging, web, mobile media, for example.
2. The focus is on the site of the image, or visual object (Rose 2016, pp. 32-34) as this is where the meaning is made. The site of production and how that may affect meaning is not relevant at this stage, nor its circulation or audiences. The critical aspect is how the Afronowism/Afrikanness quality is the dominant affordance in the creative production and meaning making.
3. Only the social modality is considered here, where “social, economic, political, and institutional practices and relations [...] produce, saturate, and interpret an image” (Rose 2016, p. 374). Rose proposes several questions that the designer may ask as a way of deciphering nuance, complexity, and variations of meaning in visual objects.

Rose (2016, p. 374) proffers the following questions one might ask about the image or visual object to determine meaning.

- What is being shown? What are the components of the image? How are they arranged?
- What is its material form?
- Is it one of a series?
- Where is the viewer’s eye drawn to in the image, and why?
- What is the vantage point of the image?
- What relationships are established between the components of the image visually?
- What use is made of colour?
- How has its technology affected the text?
- What is or are the genre(s) of the image?
- To what extent does this image draw on the characteristics of its genre?
- What do the different components of the image signify?
- What knowledges are being deployed
- Whose knowledges are being excluded from this representation?
- Does this image’s particular look at its subject disempower its subject?
- Are the relations between the components of this image unstable?
- Is this a contradictory image?

Rose’s questions are generic and emerge from a position of zero context. This research however seeks very specific ‘answers’ in order to understand the things that inform Afrikanness. As Figure 2 shows, before getting to the above questions, two levels of scrutiny are applied to the designed artefact, making it necessary to customise their interrogative point of view to a more Afrikan context (Figure 2).

The negotiated reading

Stuart Hall’s (1980) “negotiated reading” adapts well, outside of its mass media analysis intention, to readings of design, images and visual communication forms. The significant link is the encoding/decoding process not unfamiliar to other semiotic activity where meaning is syntagmatic. One needs to acknowledge that readers of ‘texts’ employ their individual worldviews, cultural

knowledge and competencies to understand and interpret visual artefacts (Moore 1993, p. 16). The negotiated reading sits between the dominant status quo of the extant order (political, social, and cultural) and an opposing standpoint that challenges the former. In particular in the context of the Afrikan positionality (considering a perspective that embraces Afrikanness and Afronowism), these readings still conform to the Euro-American norms. The desire is therefore to express “African ways of knowing” says Geschiere (2021 in Cadle 2022, p. 31) where familial and cultural histories, traditions, language, myths, and rituals are signifiers of the “special traits of African knowledge”. Recognising that culture and its meaning are in a state of flux, influenced by ideology, modes of representation, symbolism, and interpretive frameworks based on diverse world views is key (Cadle 2022, p. 38). This implies that ‘readings’ are affected by “‘visual competence’, that includes experience of media and the visual characteristics thereof, as well as an ability to translate ‘visual indicators’” (Pauwels 2020 in Cadle 2022, p. 39). Ergo, empiricism in the practice of visual methodologies is problematic due to the reading having to consider the fluid nature of analysis criteria and the positionality of the reader.

How the flow process for mapping Afrikanness in design is applied

It should be noted that the approaches to analysing visual material in search of Afrikanness was conceived to consider existing creative artefacts and designed objects. Essentially, it was an attempt to determine whether there is a persistence of measurable Afrikan influence in design (and design education) in South Africa. Pretorius (2015, p. 10) highlights some aspects of this like developing a South African style in the 1990s based on the vernacular, naïve illustration and hand-drawn typography, or the intent to give “voice to the African story” (Van Schie 2013), and even “attempts at drawing on and integrating ‘indigenous knowledge’ into graphic design programmes” (Carey 2006). These influences and the intention to express the Afrikan aesthetic, sensibility, style, and cultural identity into design education have not been deliberately researched and evaluated. This research is attempting to show that this is an achievable end.

The starting point is now the design brief and the artefact produced by the student that needs to be measured against the Afrikanness criteria explicated previously and presented in a more focused manner in Figure 3. In order to be able to ‘measure’ the artefact by reading its Afrikanness becomes a ‘chicken and egg’ scenario. In order to determine the Afrikanness means that a student-designed artefact is required to be measured, but the artefact itself first needs to be created based on the Afrikanness principles. This seemingly intractable problem is resolved by using an iterative approach and a trigger. The trigger in this instance being the principles upon which Afronowism is based (see 1. in Figures 2 and 3). Once that leads to generating a design solution, assuming the student has a good level of design experience, exposure to media, visual studies, identity and culture studies, and principles of visual communication, it becomes possible to begin evaluating the result by employing additional methods.

It is necessary to first identify comparable measurables for the student-designed artefact. Pauwels’ method is pitted against a selection of designed artefacts already in production, or mainstream media and graphic design, negotiating their meaning and cultural significance as per Twigger Holroyd (see 2. and 3. in Figures 2 and 3). The student-designed artefact and sample artefacts are then contrasted using the negotiated reading method and by cross-referencing shared characteristics. Rose’s Methodology (see 4. in Figures 2 and 3) provides an additional layer of questioning, as identical questions are applied to the two sets of artefacts. Certain themes and similarities emerge from this exercise, becoming a self-assessment of the student’s design. Does it embody Afrikanness? Where is it lacking? What factors or knowledge have not been considered? This sequence of interrogation is in

itself a process of self-reflection, affording an opportunity to revisit the first iteration of the design, develop modifications or make adjustments, and then repeat the cycle again until the brief requirement has been satisfied and the proposed solution is fit for purpose.

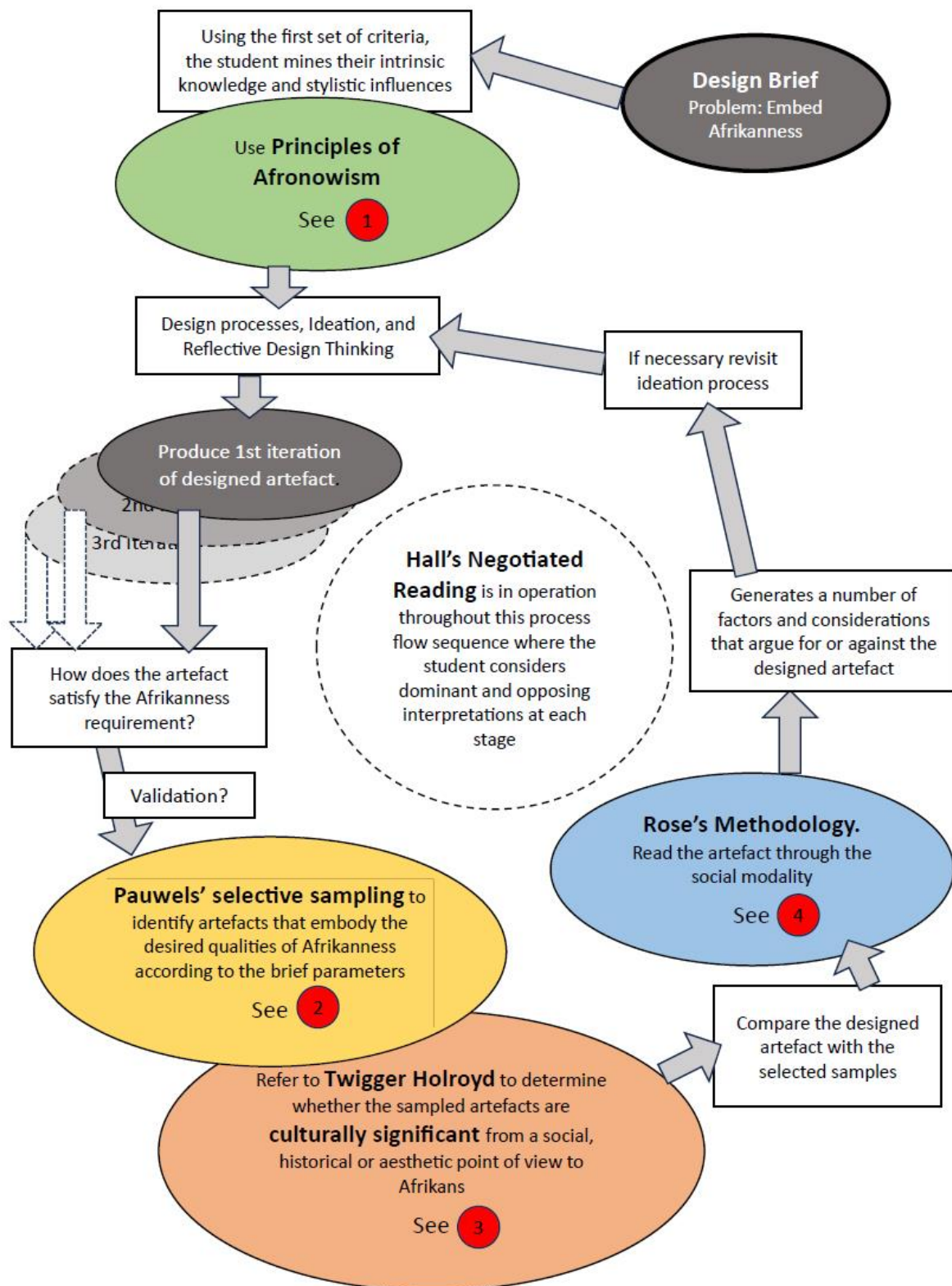


Figure 2. Analysis process flow for mapping Afrikaness in a design artefact. This flowchart should be read in conjunction with Figure 3 where the circled numbers correlate with the numbered frameworks (Cadle, 2023).

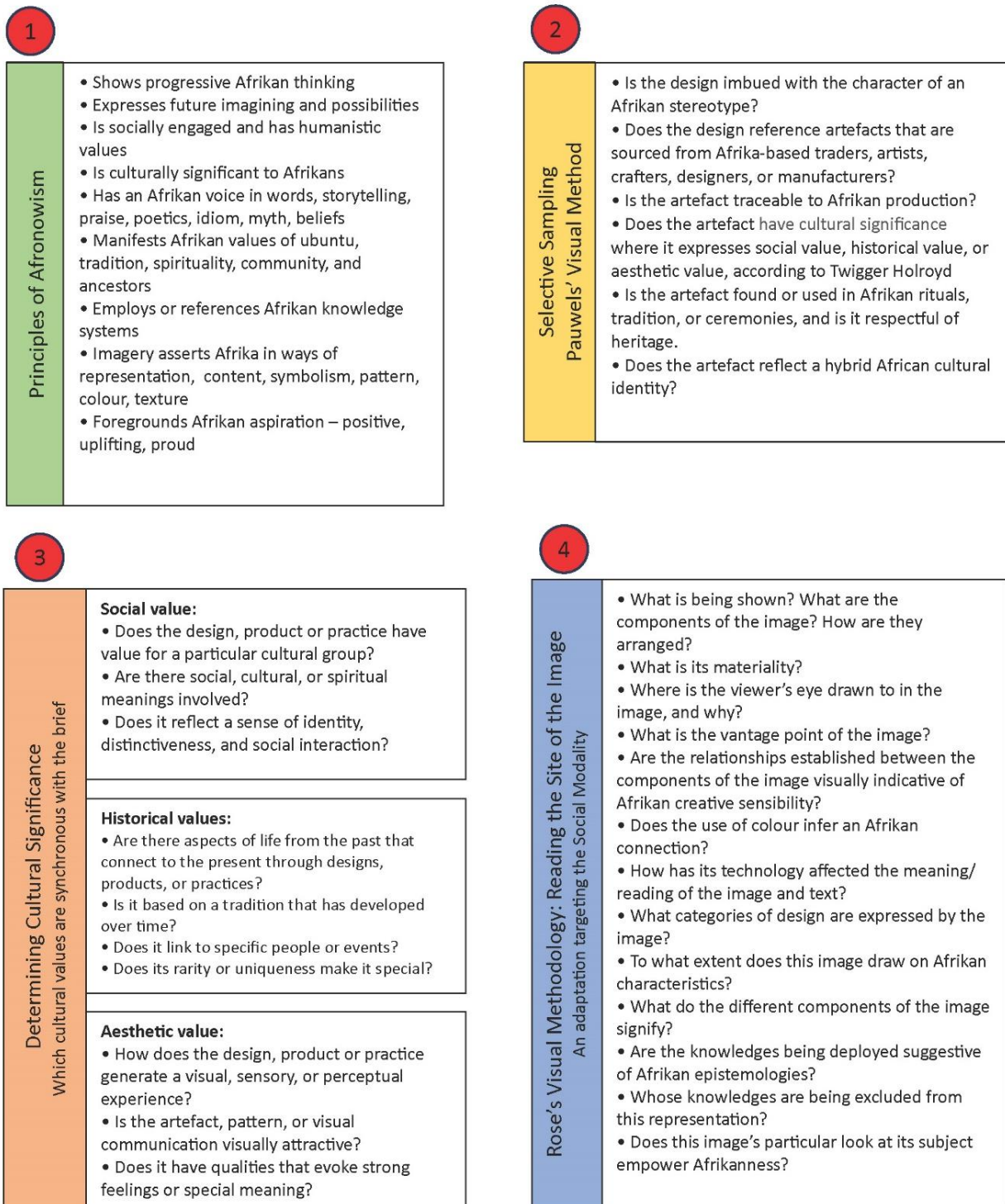


Figure 3. Analysis frameworks that inform mapping Afrikaness in a design artefact

Through the ideation and design process, the sets of characteristics, questions and values above are used to analyse the student designed artefact against the selected sample artefacts in the mindset of Hall's negotiated reading model. This is done following the numerical sequence as indicated, 1 through 4. It should be read in conjunction with Figure 2 (Cadle, 2023).

Closing comments

Two issues emerge from this study that are worth considering. Visual methodologies are complex and subjective, requiring intellectual flexibility, and a willingness to avoid absolutism or empiricism. Primarily they offer an opportunity to attempt to make sense of the meanings construed, in this instance, by graphic design artefacts. This allows for a more intentional approach to defining Afrikanness in creative output. The same model can argue for Afrikanness in Afrikaans-speakers' "boerewors" or isiXhosa-speakers' "umqombothi" and can be applied beyond the confines of stereotypes. The multivalent methodology allowed for diverse criteria to impact the considerations and processes of graphic design learning so that cultural sensitivity is maintained, and ethical awareness and a humanistic attitude is foregrounded.

Further, it is possible to deliberately target designing for a particular value system, grounded in an Afrikanist cultural identity, and able to communicate an ethos of Afrikanness. The typical processes of design research by students should therefore consider how the design solution will lead to an outcome that enfolds Afrikanness (rather than maintains a stylistic status quo) and as a result delivers an authentic (South) African experience.

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Vulindlela – making new pathways

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Design and construction: Intersections of linear and circular design

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Abstract

The multifaceted structure of higher education often limits the full integration of design and construction teaching in schools of architecture, but the potential for a greater intersection of these knowledge bases does exist. Design education in the architecture studio is typically taught through a linear process, where students are required to produce a concept design, followed by a series of design iterations and lastly, technification of the design. Similarly, in practice, this process is linear, starting with a design phase followed by a construction phase. In both scenarios, this process leads to a predictable design outcome. Contrastingly, a circular design process has the potential to allow for a more open-ended negotiation with material, technology, process, and making.

David Pye's concept of risk in *The nature and art of workmanship* reflects these possible outcomes, whether predictable or exploratory, by situating them on a scale between workmanship of risk and workmanship of certainty. In addition to tools, techniques and materials to evaluate the level of risk in making, this paper suggests that design process is also an indicator of risk. Some architectural practitioners have embraced a workmanship of risk approach by following existing circular design processes or establishing their own circular processes. This paper will highlight the work of three contemporary South African practitioners who, by employing a design process that is circular and by working in a manner that is often continuous and collaborative, have clearly expressed signs of experimentation and a material consciousness in their built work.

An understanding of how practitioners, through the implementation of a circular design process, have been able to establish these moments of intersection between design and construction earlier, and continuously throughout the design and construction process, can assist educators in transferring this approach to the classroom. The value of this improved intersection will be, improved pedagogy that limits the silo effect, forefronting building technology as a design generator, and creating better and more adaptable designers that can cope with new futures.

Keywords: Circular design, design education, design process, intersections, workmanship of risk.

Introduction

In the built environment, the relationship between practitioner and technology is expressed through architectural design processes. In the South African condition, these design processes are not well documented or clearly understood. *Practice-led* research is a way of understanding the professional designer's nature of practice. Candy (2006, p. 3) states that practice-led research “leads to new knowledge that has operational significance for that practice”. The intended outcome of this research

is to create prospects for architecture and elucidate architectural design approaches. Employing the outcome of this research in academia, by emulating practice, could potentially lead to an improved pedagogy in architectural education.

Plowright (2014, p. 2) states that “a method is present in architectural design every time a student, academic or professional designer takes on a project” and that “while methods and methodology are the more technical terms, in architectural culture, design process is used to mean a sequence of steps taken to arrive at a conclusion”. In this paper, the term *design process* refers to this sequence of steps and encompasses both the design and construction phases of a project. Considering practitioners it relates to the term *praxis* which “refers to a collection of examples or techniques that may be used as *models of practice*” (Porter 2004, p. 116). In this paper, the term *circular design process* refers to a design process that allows for opportunities for feedback, or models of practice that allows practitioners to challenge the linearity of the sequence of steps.

This paper will highlight the work of three contemporary South African practitioners who, by employing a design process that is circular, have introduced the concept of *workmanship of risk* in how the architecture is made. It is not a comprehensive overview of their portfolios but will extract, and briefly examine, completed projects that have followed similar design processes. The paper will highlight how an open-ended negotiation with material, technology, and process led to experimentation and innovation in the built work of the practitioners. It is specifically in a better understanding of these circular design processes, where the potential lies to address the siloed nature of design education.

Design education and the silo effect

The multifaceted structure of higher education often means that full integration of design and construction teaching in schools of architecture is not possible, but the potential for a greater intersection of these knowledge bases does exist. Schwartz (2016, p. iv) notes that this multifaceted structure is largely due to regulated course loads, core requirements and accreditation guidelines, among others. Knowledge fields are often isolated from each other, placing them into different silos, in order to focus on specific skill sets. Herrmann (2011, p. 346) states that “as universities face ever-increasing standards of educational effectiveness, silos become more common as a means of clearly defining the many subjects of education”. Although there is value in this, if these different knowledge fields are seldom connected, it “leaves students with an incomplete understanding of design as an inclusive synthetic act” (Herrmann 2011, p. 346).

Traditionally, the design studio has been seen as a laboratory where the intersection of knowledge fields, specifically design and construction can take place. The ideal of this *tectonic laboratory* is often not realised, where in addition to the silo effect, design is typically taught through a linear process, where students are required to produce a concept design, followed by a series of design iterations and lastly, technification of the design. This often leads to a predictable design outcome and does not explore the potential of the design studio to lead to synthetic design thinking. Innovative discovery is often made where the intersection of these silos take place, either through integrated subjects, transdisciplinary projects, or circular design processes.

Experimentation in the South African built environment

In the South African condition, the absence of experimentation and innovation in practice is evident in the limited scope of building technology employed in the built environment (Osunsanmi, Aigbavboa

& Oke 2018; Windapo & Cattell 2013). Fitchett (2009, p. 26) states that it is the responsibility of public bodies to take on the real risk of innovation in materials, construction processes, and structural systems, and that is only when the application of these becomes entrenched in the built environment that they can be absorbed by the private sector.

This is not the case in South Africa, and it falls on practitioners to take this risk. There are many restrictions in the private sector that make experimentation and innovation in practice difficult. The current design process (design + construction), with work stages set out by legislation, has meant that phases of a project and different skill sets are often siloed and not fully synthesised (Figure 1). It is a linear process where design and construction are separated, with design seen as “the immaterial presaging of form” while construction is “the material act of actualising this form” (Stein 2011, p. 51). These processes are further removed from one another where different practitioners or even different practices complete different phases of the design and construction process. Schmidt and Kirkegaard (2006, p. 133) state that “the split between the design team and the industry makes it cheaper and easier to choose an existing product from the shelf than to challenge the technological ability of the industry”.

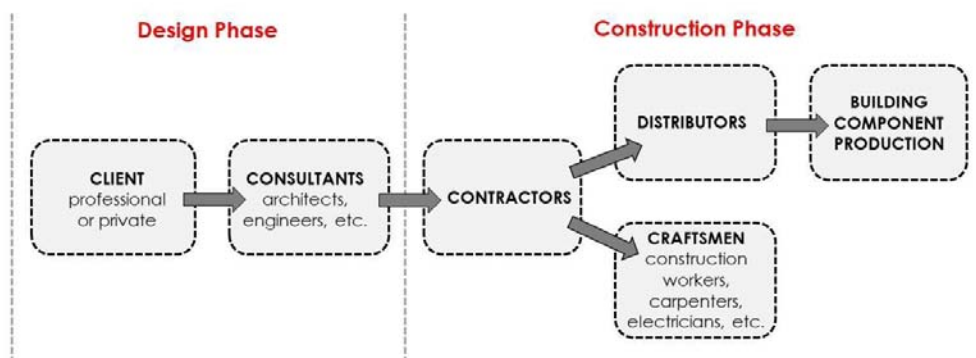


Figure 1: Linear architectural design process (Author 2022) based on a diagram by Schmidt and Kirkegaard (2006, p. 132)

Secondly, the introduction of the tendering system means that “the ability to create tectonic architecture with a close relationship between the expression and the materiality is limited” (Schmidt & Kirkegaard 2006, p. 132). The tendering process means that a design needs to be as complete as possible before construction commences, which leaves little room for experimentation or innovation after the design phase has been completed. Practitioners have to choose from off-the-shelf building components and cannot work closely together with the building industry and craftspeople in developing the design (Schmidt & Kirkegaard 2006, p. 132).

In many aspects, this way of working in practice is similar to the silo effect in higher education, generating few opportunities for *synthetic design making*, through either working transdisciplinary or establishing feedback loops, thereby not merging design and construction knowledge fields.

Workmanship of risk

Similar to the design studio, the process followed in practice is mostly linear, starting with a design phase followed by a construction phase. In both scenarios, this process often leads to a predictable

design outcome. A circular design process has the potential to lead to wider exploration by introducing the concept of risk.

Authors such as Pye (1978) and Kolarevic (2008) both suggest that high risk can yield positive design opportunities. In other words, through risk in the material, tools, and techniques, the workmanship is pushed to its limit and new knowledge can be generated (Loh, Burry & Wagenfeld 2016, p. 189).

David Pye's concept of risk in *The Nature and Art of Workmanship* (1968) reflects these possible outcomes, whether predictable or exploratory, by situating them on a scale between *workmanship of risk* and *workmanship of certainty*. Loh, Burry, and Wagenfeld (2016) formulate an analytical diagram (Figure 2) which allows practitioners to compare different making activities, and judge and evaluate the level of risk in making. This is done through a framework that highlights the relationship between tools, materials, and techniques. This author suggests that, in addition to a degree of uncertainty in the making process, a degree of uncertainty in the design process, can also be considered *workmanship of risk* and therefore has the potential to lead to experimentation and new knowledge.

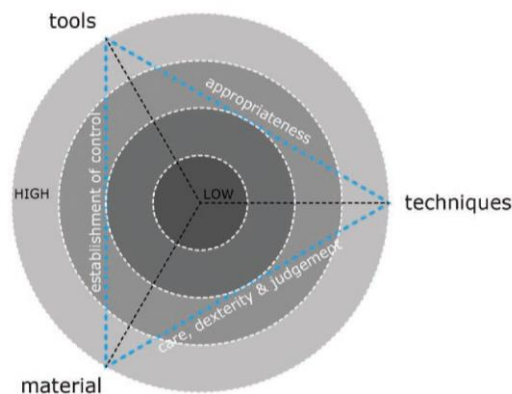


Figure 2: Possible outcomes situated on a scale between *workmanship of risk* and *workmanship of certainty* (Loh, Burry & Wagenfeld 2016, p. 192)

Existing and new circular design processes

A circular design process has the potential to allow for a more open-ended negotiation with material, technology, process, and making. This has the potential to lead to the development of innovative fabrication solutions and expressive form. In practice, circular design processes that follow a feedback loop already exist. Some of these are circular by nature, e.g., *craft mode* or participatory design, others have traditionally been linear but are managed in such a way that they have become circular through design, e.g., digital manufacturing. Some practitioners have however found ways to work, or continue working, in a more traditional manner by being actively involved in the entire process, embracing a *workmanship of risk* approach by following circular design processes.

Practitioners: Kate Otten, *earthworld* Architects and Peter Rich

Practitioners were selected for the experimental nature of their built work as is evident in the range of interpretations of tectonic expression. Schwartz (2017, p. xxvii) states that “architectural tectonics seeks a relationship between the design of space and the reality of the construction that is necessary for it to exist”. In the case of Kate Otten, André Eksteen and Braam De Villiers of *earthworld* Architects, and Peter Rich, it can be argued that their architectural outputs are innovative and display a range of

responses. They have different ways of working but it is the circularity of their design process that they have in common. Otten's continuous involvement in the design and construction process inculcates a focus on craft and making in the design process, whereas *earthworld* Architects can be considered to be an experimental design practice, with a focus on digital manufacturing, while Rich's long history of working collaboratively established a strong participatory design tradition within the practice.

Kate Otten and *craft mode*

Traditionally craft has been defined purely as a form of execution, but current architectural discourse is expanding the definition to include the role of craft as exploration. Rossi (2017, p. 2) states "to consider craft is simply to be interested in making: to understand things, be they chairs or cities, as artefacts that demand asking how they have been made". Loh, Burry and Wagenfeld (2016, p. 187) write that "the authenticity of craft lies within the deeper structure of the practice". This broader interpretation of the term craft suggests a relationship between the process of making and craft. Stein (2011, p. 52) suggests the term *craft mode* and defines it as a developmental feedback between material and human intelligences.

Kate Otten Architects is a practice that is intrinsically aware of *craft mode* as design process and Otten (1998, p. 53) states that "the design process is a fluid one, often organic; a process that never ends even after the building is *complete*" and continues "simple, inexpensive, well-known materials and method are used in an innovative way. This is also where the people involved in the process – the artisans and craftspeople – become very important".

Otten's design education took place at UKZN (University of KwaZulu-Natal) and Wits (University of the Witwatersrand). It was particularly the foundation years at UKZN, dominated by the term *practice*, being taught by Rodney Harber (1940 -) and exposed to the Building Design Group (1968-1977), that instilled a passion for craft and making in her (Lokko 2016, p. 17). Otten started her practice (1989) with a project called the *Pineapple Republic*. It was one of a pair of semis in Melville that was renovated by Otten and her team of builders. A restrained budget meant that materials were recycled and reused in inventive ways (Otten 2013, p. 12). Otten (2013, p. 13) states that it is with this project that she started "experimentation with architecture and buildings".

Otten (2013) highlights the importance of experimentation through self-build projects, which she refers to as *construction for self*, that often have been testing grounds. "They are places where risks can be taken which would be dangerous or inappropriate with a client" (Otten 2013, p. 12). The *Pineapple Republic* was the first or a series of testing grounds, the *Love Shack* (2006) at Utopia in the Magaliesburg followed, then her family home *Our House* (2007) in Parktown North, and most recently and most ambitious *Lulu Kati Kati* (2010) in Melville (Figure 3). Otten actively engages in both the design and construction process, working as a *traditional* practitioner that is involved in the entire process.



Figure 3: Structure and interior view of *Lulu Kati Kati* (Kate Otten Architects n.d.)

Otten’s way of working can be seen in the practice’s Art Therapy Centre (1996) in Soweto. “The architect’s role becomes that of setting down a precise design intention that is strong enough to allow for and incorporate the unexpected [...] The builder is not expected to just follow instructions, but to give interpretation to drawings, images shown or samples made with/by the architect” (Wolff 2008, p. 23). Both in the entrance pergola and the dome structure, main elements; columns, beams, height and proportion of the dome, are shown in drawings, but the positioning of secondary elements, and the exact texture and brick patterns, becomes the contractor’s interpretation (Figure 4). This process includes the embedded knowledge of tradespeople and this collaborative approach is fundamental to realising these experimentations. Wolff (2008, p. 25) writes that “Kate Otten’s working method is an open-ended design process that allows for the pleasures of making to be registered in the form and it is not reliant on a conception of predetermined perfection”. Otten (Kate Otten Architects n.d.) states that for her “the ‘making’ of the building, is as significant as the design process”.

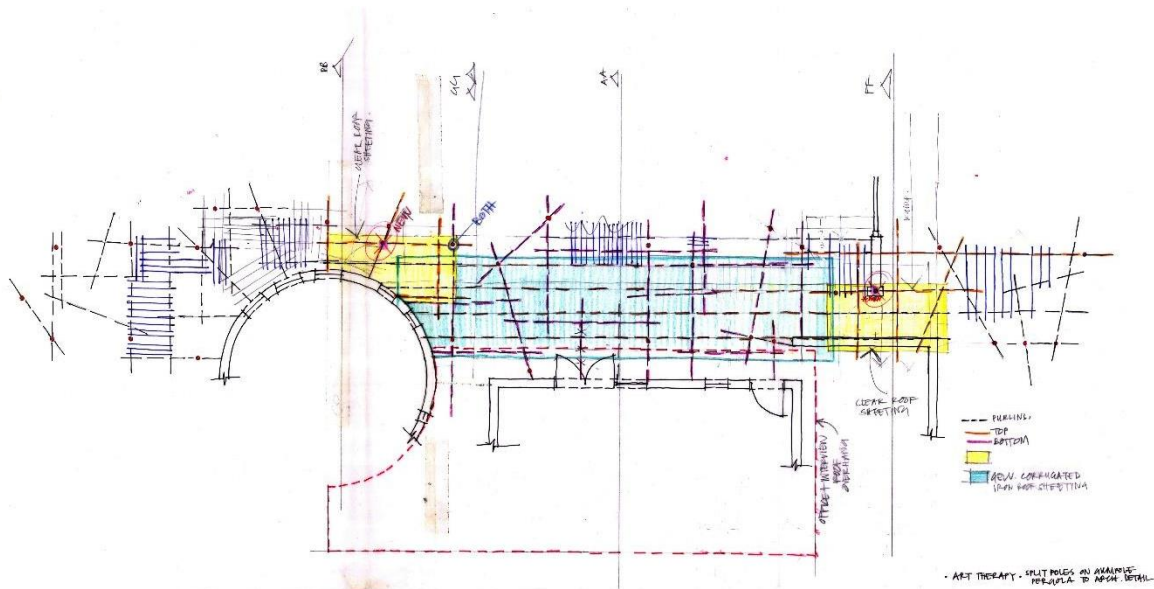


Figure 4: Sketch plan of pergola at Art Therapy Center (Kate Otten Architects n.d.)

earthworld Architects and digital manufacturing

Digital manufacturing in architectural design and documentation has often been a siloed process, but by purposefully designing the process to be circular, it has allowed practitioners to be actively involved in the entire process. A made-to-measure, direct-to-drawing process provides an alternative model for the designer to develop and manage fabrication with unprecedented involvement (Overall et al. 2018, pp. 173-175).

Loh (2019, pp. 40-42) looks at different approaches to digital fabrication in architecture and sketches out a 'digital material practice' approach that "impart[s] knowledge that can play a critical role in the design process". In a conventional approach, "digital fabrication enables designers and architects to realise their virtual models as physical artefacts, in the form of 'file-to-factory' procedure", therefore "digital fabrication is a means to an end to achieve the outcome" (Loh 2019, p. 41). In an alternative approach digital fabrication is deployed "as a means to calibrate and negotiate the virtual model with physical artefacts" and "usually takes the form of prototypes that either function as proof of concept or as one-off production where the building itself is the prototype" (Loh 2019, p. 42). Here "the design intent is to explore novel fabrication techniques or material systems with the aim to capitalise on digital fabrication technology for material, spatial, or perceptual effects" (Loh 2019, p. 42) while seeking a sense of economy and buildability.

earthworld Architects is a practice that questions the relationship between digital processes and making. De Villiers and Eksteen state that "in our practice, we explore the role of architecture and technology (not industry) to bridge the gap between the system (non-tangible, abstract) and the physical (materiality, form, texture)" (*earthworld* Architects n.d.). Barker (2019, p. 28) states that *earthworld* Architects "argues for the reinvention of the craftsperson, using new technologies, as a counter to modern-day standardisation". This has led *earthworld* Architects to explore a different organisational structure and new workflows, necessitated by the unique relationship with fabricators that the direct-to-fabrication process creates. By establishing a direct-to-fabrication division within the organisational structure of the practice, a circular design process is implemented. "This leads to "shortening the distance between design thinking and fabrication processes" and "removing the divide between the architect and fabricator" (Overall et al. 2018, p. 174).

After establishing the practice in 2000, House Visser (2000) with its "use of a brick barrel vault and contrasting light steel window frame, signifies the beginning of the practice's unconventional tectonic experimentation with materials and structure" (Barker 2019, p. 24). The project also entrenched in the practitioners a way of working as *traditional* practitioners that are involved in the entire process. The architects state that "the project offered the opportunity to become intimately involved in the construction process, where detail development would only be complete on completion of the construction process" (*earthworld* Architects n.d.). Barker (2019, p. 25) writes that "it can be argued that their design process is organic, which allows for a multiplicity of inputs, not only from the client, but also from those making the buildings".

Over the years, the practice has experimented with a variety of materials, starting with brick, moving on to concrete, then steel, and most recently, timber. In the HEFF Quipaco Hunting Lodge (2010) in Mozambique, the practice began experimenting with prefabricated timber construction in a factory setting with transport to and installation on site. House Alto (2013) in the Cape "is an extension of these ideas using a combination of steel and timber frames made off-site and erected in situ" (Barker 2019, p. 26). Parallel to this material evolution, the practice also started experimenting with digital fabrication in the form of pre-manufactured CNC (computer numerical control) cut steel and plywood, first in interior furniture elements and then small building components.

These approaches culminated in the realisation of Future Africa Innovation Campus (2018). It is specifically in the Dining Hall that the “intention to challenge existing design and construction processes by combining high-level design processes with local resources and skills” (earthworld Architects n.d.) manifests. Through multidisciplinary partnerships with designers and manufacturers, a birch plywood portal frame was developed to carry the envelope. “Designed in detail and modelled 3-dimensionally in the architect’s offices, then sent to CNC machines for cutting and manufacturing the off-site components, before finally being rapidly assembled on site” (earthworld Architects n.d.).

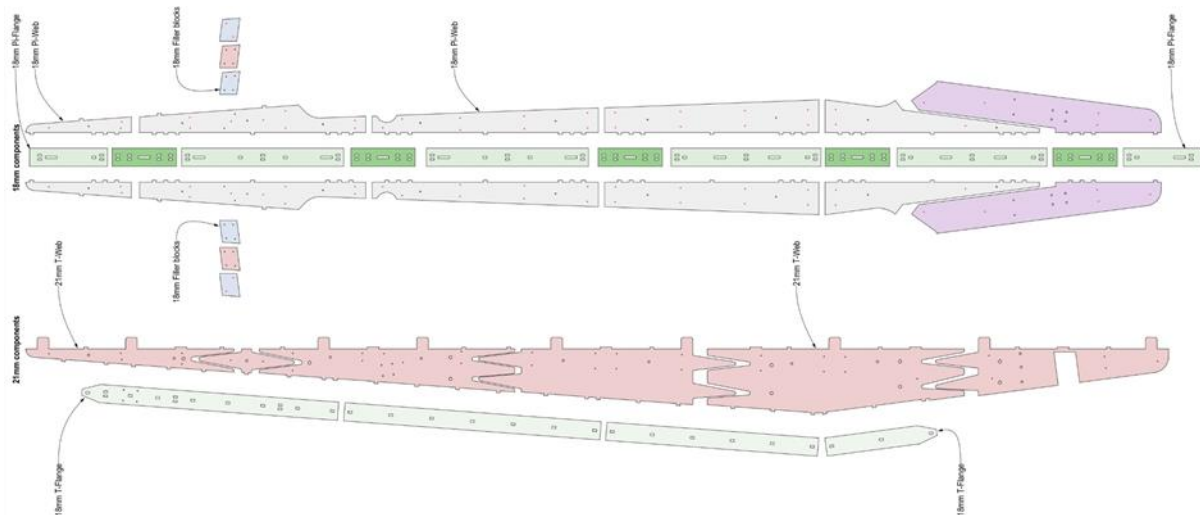


Figure 5: Cutting layout for a plywood rafter (earthworld Architects n.d.)

Their approach of “making as a means of generating design knowledge in the process” (Loh, Burry & Wagenfeld 2016, p. 187) has meant that the exploration of digital fabrication processes is ongoing (Figure 5). Collaborating with York Timbers the practice has been able to construct some plywood elements with local SAP (South African Pine) plywood instead of imported Birch plywood. This has led the practice to develop a complete plywood structural system, manufactured through a direct-to-fabrication process, and constructed on site using only basic tools and minimal labour. This system was tested in the *Kospaza* (2021) project, a small plywood spaza shop, constructed in just a few days (Figure 6).

earthworld s Architects’ engaged material consciousness and fascination with material craft means that they are able to merge their ideas with new forms of digital technology and fabrication processes. They have found ways of realising these experimentations by following a circular design process facilitated through digital manufacturing.



Figure 6: Rapid assembly of prefabrication components for *Kospaza* (earthworld Architects n.d)

Peter Rich and collaboration

On the formation of the *Bauhaus*, Bannon and Ehn (2012, p. 38) write that “early modern design was, if not explicitly participatory, at least programmatically collaborative”. They highlight the importance of the *Bauhaus* workshops as forming the foundation for collaborative building activities. “It was collaborative and interdisciplinary, joining the different design competences of art, craft, architecture and technology – in order to build a genuinely collaborative design work (Bannon & Ehn 2012, p. 38).

It is a process through which the open-ended approach encourages participatory practice in its design, construction, and everyday use. Tim Brown (Bannon & Ehn 2012, p. 55) argues that “design should be viewed as a collaborative effort where the design process is spread among diverse participating stakeholders and competences; ideas have to be envisioned, ‘prototyped’ and explored hands-on, tried out early on in the design process, in a process characterised by human-centredness, empathy and optimism”. When referring to participatory processes, Low (2014, pp. 324, 326) writes that by embedding local skill and community effort it is possible to effect contemporary architectures, which appear to be capable of providing stronger direction for an African Architecture. In addition to social innovation, it is a design process that also has the potential to lead to inclusion of indigenous building technologies through the exploration of materials, construction techniques, and structural systems.



Figure 7: Peter Rich and Senthil Kumar Doss (SKUD) collaborating on workshops in Bangalore, India (Rich 2023)

In the practice's community work prior to 1994, "Rich took an unconventional path, engaging with communities, acting as architects and also as a facilitator" (Hall 2011, p. 12). This participatory design process, long periods of community engagement and consultation, led to the completion of a series of small community buildings, Tembisa Medical Clinic (1988), Tembisa Sports Centre (1988), and Elim Shopping Centre (1986). After 1994, Rich was involved in a series of important cultural heritage projects. During this time, a number of community consultation projects were completed by the practice, Bwanari community-owned lodge (2000), Lekgophung brick-making cooperative (1999) and the Bopitikelo Community and Cultural Centre (2002). Parallel to this, he was appointed as the co-director of the UNESCO project Growing up in Cities, where he helped to facilitate participatory projects in Canaanland, an informal settlement in central Johannesburg. By making use of indigenous construction knowledge and skills, "gum poles for structure, thatch for the roof covering, and locally gathered stone and soil bricks for walls" (Hall 2011, p. 17), the architectural interventions engaged and empowered local communities. Cooke (2011, p. 1) states that "in community projects, he works directly with members, learning from their skills and helping to give them current valency".

The most ambitious of these was the Alexandra Interpretive Center (2002-2018), initiated in 2000 by the government. At the start of the project, Rich formed part of the Heritage Agency team that mapped the oral heritage of the area, which includes Mande's Yard, home to Nelson Mandela in 1942. A team of local residents were trained to complete this process. Due to irregular funding, the project was restarted multiple times with different stakeholders involved, leading to a programmatic hybridisation. Not only did this mean that the participatory process was ongoing but as Hall (2011, p. 23) states "serves to accentuate the notion of building as process".

Focussing on the multidisciplinary characteristics embedded in participatory design processes, Rich challenged the typical linear way of working by evolving a multidisciplinary team from the first stages of a project (Figure 8). At the Mapungubwe Interpretive Center (2009), a chance encounter with Issay Benjamin led to an introduction to John Ochendorf (Massachusetts Institute of Technology) and Michael Ramage (Cambridge University), both leading world experts on timber- vaulted structures (Noble 2020, p. 138). The involvement of the engineering team from the inception of the project, together with Anne Fitchett (Wits) research into the production of stabilised hand-pressed soil tiles, led to the completion of this innovative project, despite a highly unique set of constraints regarding materials and labour (Noble 2020, p. 139).

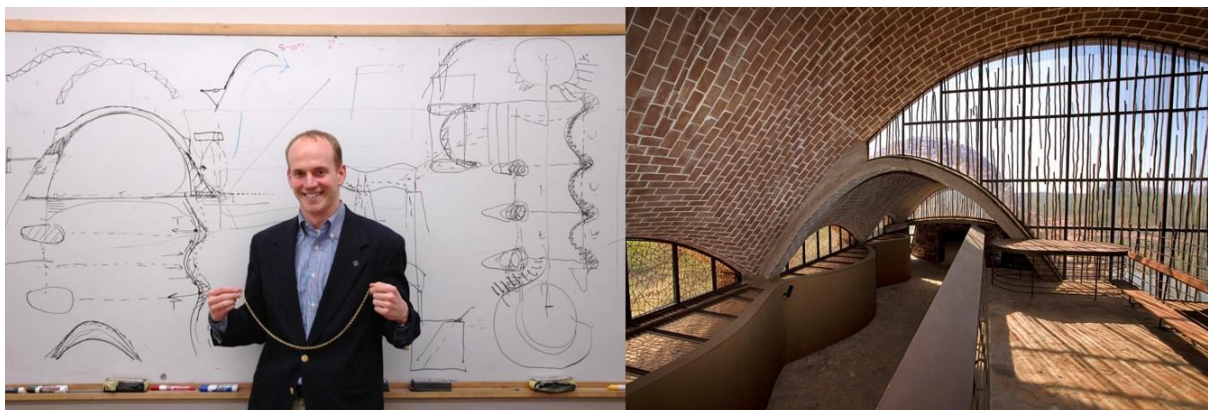


Figure 8: Peter Rich and John Ochendorf collaborating on the Mapungubwe Interpretive Center (Rich 2023)

This explorative way of working contributed to the project winning World Building of the year in 2009. The project demonstrates innovation on four fronts; building materials used, the application of geometry, the unique construction methods, and structural calculations.

Conclusion

The silo effect in higher education has meant that students are often tasked only with small questions of design, leading to fine-grain answers. If a continuous overlap of knowledge fields does not occur it has the potential to lead to students graduating with only siloed design thinking skills. The multifaceted structure of higher education is in many ways similar to the linear and phased way of working, found in practice. The circular design processes of craft mode, digital fabrication and participatory design, have allowed Kate Otten, *earthworld* Architects and Peter Rich to work in a way that fully integrates different skill sets into fully synthesised built works.

By embracing circular design processes, the selected practitioners have been able to introduce the *concept of risk* in their way of working, overcoming constraints imposed by the South African built environment, to produce experimental and innovative projects. These practitioners are dedicated to experimenting with how the architecture is made. By being involved in the entire design and construction process, through a circular design process, consistent intersections between design and construction transpire. The completed projects highlight the importance of working collaboratively and transdisciplinary, prototyping and learning through making, a material consciousness where material has the potential to become a generator of form, and a focus on building technology to encourage the development of innovative fabrication solutions.

An understanding of how practitioners, through the implementation of circular design processes, have been able to establish these moments of intersection between design and construction earlier, and continuously throughout the design and construction process, can assist educators in transferring this approach to the classroom. Finding ways to emulate these circular design processes in the studio, can lead to the introduction of the *concept of risk*, in what has often become, largely due to the multifaceted structure of higher education, a typical linear design process with predictable outcomes.

The studio has the greatest potential for distinct knowledge fields to become smudged and muddled, leading to synthetic design thinking and making. It is the role of the studio instructor to find ways of disrupting *workmanship of certainty* by introducing risk or variables. Attempts at reconfiguring the design studio to align it more with the ideal of the *tectonic laboratory* have been made, most notably through the design/built project run by *Rural Studio* at the College of Architecture, Design and Construction's (CADC) in Newbern, Alabama, and locally by the *Unit for Urban Citizenship* (UUC) at the University of Pretoria, with a focus on new forms of participation and engagement. These studios reflect the value of working with mock-ups and prototypes in the design process, as well as the fundamental practice of experimentation and learning-by-doing.

The value of an improved intersection between design and construction will be improved pedagogy that limits the silo effect, forefronting building technology as a design generator, and creating better and more adaptable designers that can cope with new futures.

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Textualising visual stimulus: A visual methodology to encourage innovation in fashion design education

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Abstract

Fashion design and its pedagogy is fundamentally centred around visual representation. A core conceptual component of the fashion industry and design education is mood boards, concept boards or trend boards, which purpose is to communicate design direction or intent and to provide a starting point for the design process. Content for these boards relies predominantly on visual data; due to the internet and social media, students and designers have unlimited access to visual stimulus. Reflecting on personal design constraints and teaching experiences in fashion design at a leading South African design education institution, it became clear that the influx of visual data, both through the use of these boards and freely available images on social media, affects original design thinking. The overwhelming quantity of visual stimulus tends to encourage reproduction rather than fuel innovative design. This often occurs sub-consciously as students are immersed in the content, without critically distilling what is seen. Furthermore, it fosters a sense of inferiority among students, as they often cannot reproduce the same quality of design as seen online.

To address this issue, an alternative method of using these boards and/or visual stimulus is proposed. Traditionally, fashion design education requires students to develop designs directly from these boards. The proposed method requires an intermediate step, where the visual data is analysed based on design elements and principles and converted to textual descriptors that become the criteria for designing. This textualisation of images, aims to provoke design ideas, removed from the initial visual stimulus. This proposed method does not only aim to increase innovative design practice, but simultaneously develop critical engagement with visual data and enhance visual literacy. As students become more skilled in translating, interpreting, analysing, and understanding visual stimulus, this method could become intrinsic to their design practice and lead to more innovation, originality and individualised/personalised designer signatures that avoid the trap of reproduction and imitation.

The accessibility of influential and inspirational images should be celebrated, especially considering the rate at which technological advancements are being developed, however how designers and students utilise these images needs consideration. By introducing a simple method within the way students use visual data, critical thinking can be developed, visual literacy improved, and innovative design encouraged.

Keywords: Fashion design education, innovative design, mood board, textualising visual stimulus, visual methodology, visual literacy.

Introduction

In the field of applied design, the design process and outcome revolve around the action of visual problem solving and becomes a visual act in itself (Boradkar & Dhedphale 2019, p. 220). Fashion design is no different and is fundamentally grounded in visual representation. Therefore, teaching and learning techniques employed in fashion education, are reliant on visual methodologies. Within fashion design, mood boards are often employed as a design tool, an inherent visual methodology, embedded in the design process.

Mood boards are widely used in fashion pedagogy and the fashion industry. Various forms of visual boards can be used such as mood, trend, colour or trims and fabrication boards. This paper focuses on visual boards that aim to represent the collective design intention, rather than boards that depict specific design elements. For the purpose of this paper, visual boards capturing a broader perspective of design intention are referred to as mood boards. This term should be understood as an umbrella term for visual boards that aim to communicate design intention, including terminology such as presentation boards (Cassidy 2011, p. 230 and Hopkins 2018, p. 147), concept boards (Aspelund 2015, p. 109; Cassidy 2011, p. 230; Gaimster 2015, p. 166) and theme boards (Sorger & Udale 2020, p. 24). Although this paper is aimed at the mood board, the method could be applied to any visual board, regardless of its purpose within the design process.

Various research has been conducted pertaining to mood boards, such as analysis methods in selecting mood board content (De Wet 2017), mood boards' role as a qualitative research method (Cassidy 2011) and the assessment and evaluation of the mood board (Freeman, Marcketti & Karpova 2017). However, what is in question is how should the mood board be used in the design process? And how to navigate creative thinking in a visually saturated context? Reflecting on personal experiences in fashion design education, as a student and lecturer, it was established that there is a missing component in teaching and learning regarding the application of the mood board within the later stages of the design process. Furthermore, postgraduate students tend to struggle less with utilising the mood board as a design departure point, compared to undergraduate students. Kędra and Źakevičiūtė (2019, p. 1) explain that although students live in a highly visual-focused world, they are "often visually illiterate", struggling to interpret and understand images. Often experienced designers interpret the mood instinctively (Cassidy 2021, p. 235), which could explain why postgraduates apply mood boards more effectively than undergraduates. Time is invested in training students on layout, visual impact, and coherency, as ultimately the hope is to achieve a clear, concise, and uniform message that guides the design process. However, exploration in applying and using the information communicated in the mood board are lacking. How does one translate, dismantle, and integrate the content presented in the mood board? How does one use the mood board information without replicating what is seen? How does one move from the design intention to the act of meaning making, and fashion design making?

This paper is proposing a mood board analysis framework that decodes the image-based content of the mood board into text. Through shifting the modality from visual to text, the hope is to propel design-intention into design-action, revitalise the mood board as a core component of the design process, encourage innovation, and avoid duplication of visual stimuli.

The role of the mood board

Mood boards encompass a visual synthesis of design intention and serve as a non-verbal communication tool within the design process. In a field where visual representation takes central

focus, it is vital that modes of investigation and communication follow a similar modality. McDonagh and Storer (2004, p. 17) highlight why mood boards are an effective communication tool by stating that:

Verbo-centric approaches for gathering data and design communication (e.g., interviews, focus groups, questionnaires) are well developed. Research indicates that individuals tend to lie on a bipolar scale between verbalist and images (Riding and Rayner, 1998). This indicates that if we restrict our communications to one media (i.e., words), we are potentially reducing the effectiveness of communication [...] mood boards can offer a visual-centric approach.

Mood boards are important in fashion design education, not only as a means of assessment, but also to prepare students for industry practice, as these boards are widely used within the professional arena (Freeman, Marcketti & Karpova 2017, p. 3). In a survey conducted with practising designers by McDonagh and Storer (2005, p. 20), a participant indicated that even if mood board creation is not practically executed in industry the process thereof is inherently explored “in their heads”. Aspelund (2015, p. 97) argues that mood boards serve a vital role in conceptualisation, where possible design solutions are explored visually, by collecting and curating images. The purpose of the mood board has been indicated as:

- Visually conveying design intention (Aspelund 2015, p. 97; Gaimster 2015, p. 166)
- Communicating complexities difficult to verbally communicate, i.e., evoking emotion, feelings and moods (McDonagh & Storer 2005, p. 18)
- Informing and presenting creative thinking (Aspelund 2015, p. 97; McDonagh 2005, p. 37)
- Enabling innovative thinking and application (Cassidy 2011, p. 225)
- Providing visual and creative stimulus (Aspelund 2015, p. 97; Sikarskie 2020, p. 176)
- Capturing traceability of ideas, visualising their origin (McDonagh & Storer 2005, p. 20)

These purposes emphasise the valuable contribution mood boards provide to concept development within the design process, combining multiple images to collectively communicate a singular coherent message relating to the design intention. Therefore, the purpose of the mood board could be synthesised as: to translate the intangible to tangible and provide guidance or inspiration to the designer. McDonagh and Storer (2005, p. 18) explain that source material for these boards loses their initial meaning through reconstruction and application within the mood board to ultimately communicate the design concept constructed by the designer. Consequently, becoming a new “singular” image, or as stated by De Wet (2017, p. 17) a “complete picture”, rather than multiple components. This process might sound simple, however, students often struggle with mood board creation and use, the following section will explore some of these challenges.

Challenges in mood board creation and use

As with all modes of teaching and learning, there are challenges to consider. Reflecting on personal teaching experience within the context of mood boards, the following challenges emerged: overwhelming access to visual stimuli, lack of visual literacy and duplication of online content. These are by no means the only challenges; however, these relate directly to the proposed method of this paper. It is vital to consider challenges as to best tailor the proposed method to address relevant challenges that are currently evident.

Overwhelming influx of visual stimuli

The careful consideration of source material for mood boards has become an increasing necessity due to the influx of freely available online visual stimulus. Meeker (in Li & Xie 2020, p. 1) indicates that in

2015 an average of 3.2 billion digital images were shared daily via social media platforms. Whereas in 2021, Instagram and Facebook collectively recorded an average of 305,000 images shared every minute (Ali 2021). Li and Xie (2020, p. 1) argue that online platforms have shifted its focus from text to visual and the fashion industry is not an exception. Accessibility to visual content has opened the fashion industry to a wider audience. As Lascity (2021, p. 179) points out, the internet and social media have been the “fall of the gatekeepers” in the fashion industry.

Livestreaming and global sharing of online content enable audiences to access fashion shows historically reserved for elite society. Access to trends, ranges, and fashion shows has democratised fashion, allowing equal accessibility across socioeconomic groups (Barnard 2017, p. 4). Thus, students are now able to view the latest fashion designs almost immediately, as some brands livestream fashion shows, whereas others share video recordings shortly after launch events concluded (Bendoni 2017, p. 43). Access boundaries are being redefined by instantaneous sharing and global connectivity offered by the internet and social media.

Access to more design solutions and fashion innovation sounds euphoric, as it opens avenues of exposure to design sophistication, which is challenging to convey in the classroom. Wider access provides a broader basis for exploration and research into possible design solutions. However, freedom in access has fostered a generation where instant gratification is normative (Halliday 2022, p. 83), making engagement and exploration seem obsolete in comparison to the instantaneous culture that media has adopted. Amidst overwhelming accessibility to visual content how should students navigate the influx of images to select appropriate and effective content for their mood boards?

De Wet’s (2017, p. 21) research addresses this concern, using a short analysis questionnaire which aims to aid students in identifying relevant and meaningful source material for their mood board. Figure 1 shows the resulting questionnaire from De Wet’s research.

Identify the criteria for the visual analysis:

<p>1a) Identify and list the sensory design elements of the intended design concept that you are looking for in the images in terms of:</p> <p>Image subject: Colours: Lines: Forms and shapes: Texture and detail:</p> <p>Image number:</p> <p>2) Carefully analyse and describe the sensory content of an image:</p> <p>Image subject: Colours: Lines: Forms and shapes: Texture and detail:</p> <p>4) Write down one connecting sensory and one connecting symbolic aspect between all the images.</p> <p>5) Evaluate and rate the relevance of each image: Based the above analysis, use the four-scale descriptions below to evaluate and rate the representational relevance of an image against the identified analysis criteria.</p> <p>Encircle/highlight the relevant choice:</p> <ol style="list-style-type: none"> 1. Not relevant at all – the image needs to be excluded. 2. Several aspects are not relevant – the image needs to be excluded. 3. Most aspects relate – the image can remain for final consideration. 4. Excellent representational relevance – the image is a definite choice. 	<p>1b) List and describe symbolic elements of the intended design concept that you are looking for in the images:</p> <p>Attach the image here:</p> <p>3) Interpret the analysis of the sensory elements of an image and link possible symbolic meanings to the content:</p>
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Figure 1: Identify the criteria for the visual analysis (De Wet 2017, p. 21)

In the context of textualising the mood board, which this paper is proposing, De Wet’s questionnaire focuses on similar criteria outlined in Table 3 (**Proposed method**). By completing De Wet’s

questionnaire, students can identify relevant source material that supports their design concept. However, if there is a lack of visual literacy, identifying relevant source material could be difficult.

Visual literacy

In the most simplistic form, visual literacy refers to the ability to understand visual content. For higher education, visual literacy becomes an effective teaching tool to enhance critical engagement because it is “closely related to critical thinking as it involves a set of cognitive processes that range from simple identification to complex interpretation at contextual, metaphorical, and philosophical levels” (Romero & Bobkina 2021, p. 1). According to Hope (2020, p. 11) visual literacy can be categorised as functional, narratorial or aesthetic. Functional visual literacy refers to images that convey instruction, narratorial convey sequential progress of stories and aesthetic entails understanding and interpreting images based on cultural and social values (Hope 2020, pp. 12-15). The literacy required for mood board creation and the proposed analysis method of this paper, would form part of the latter category. Aesthetic visual literacy also coincides with the visual literacy required to interpret the meaning of clothing and fashion.

Visual literacy lies at the core of mood board creation, requiring the creator to understand, interpret, and apply various images into a unified message. Although this understanding of “multiple-to-singular” is fundamental to mood board creation, achieving a coherent message across various images in a single board is challenging. De Wet’s (2017) research highlights that critical analysis of source material could enhance coherency, since the selection process would be guided to identify appropriate images when constructing a mood board. Cassidy (2011, p. 232) explains that these images should not be viewed literally, but rather as conceptual or symbolic, which could shed light on why this process is problematic to those lacking visual literacy.

Lack of visual literacy is often overlooked, since understanding and translating visual information is a constant factor of life. Images and symbols form part of contemporary society and are entrenched in communication (Hope 2020, p. 26). It has mobilised communication beyond language, cultural and geographical barriers, for example washing instruction icons on clothing labels allows for international communication without a single word. Society’s natural inclination to resort to imagery in communication is evident in how text messages are conveyed, with emojis becoming common practice in texting. Although the use and understanding of visuals have become embedded in contemporary life, there is still a disconnect among students (Kędra & Žakevičiūtė 2019, p. 1). De Wet (2017, p. 17) argues that a deeper level of design thinking is required to achieve visual literacy among students and outlines the following sequential steps to develop sound visual literacy when selecting source material for mood boards:

1. Develop source material evaluation criteria
2. Evaluate source material sensory design elements
3. Interpret symbolic connotations of source material based on sensory design elements
4. Based on the previous steps develop an educated opinion and assess the symbolic relevance of images
5. Synthesise the symbolic connections between images and group coherent meanings together
6. Groupings that support the overarching design concept would be the most appropriate.

Cassidy (2011, p. 235) notes that the above process could be substituted by intuition when designers are accustomed to mood board creation or have advanced visual literacy skills. Understanding what is seen seems like an arbitrary act, inherently processed; however, it is far more complex. There is an interrelationship of constant negotiation between the image and the reader of that image. Reilly

(2021, p. 64) explains that this negotiation is influenced by context and the interpreter. Both play a vital role in constructing meaning. In the case of a mood board, the interpreter is the designer. The context is more fluid, but controlled by the designer, as it is constructed through the juxtaposition of images within the mood board. This again highlights the importance of selecting appropriate and meaningful source material for the mood board. Hope (2020, p. 6) points out that the image-reader negotiation becomes more prominent and complex when referring to abstract notions and symbolic representation. Considering this complexity, another concern is raised: the articulation of what is seen.

In a time where access to visuals is seemingly limitless, the ability to discuss images is unexpectedly lacking (Romero & Bobkina 2021, p. 4). This emphasises the necessity to focus on multimodal (visual and text) engagements in education. The challenge to discuss visual content could be due to articulation difficulties, exasperated in the South African context, with eleven official languages and English as the predominant academic language. This becomes especially challenging to ESL (English as second language) students. In some cases, English is a third language, therefore conveying design intention in text becomes particularly challenging. Pineteh (2014, p. 20) explains that in South Africa, there is a disparity in literacy skills when students enter higher education, which negatively impact students' ability to communicate ideas in a language that is not their mother tongue. The materiality of the mood board inherently addresses this core challenge faced by ESL students, as the boards provide a platform to visually communicate design intention, aiding students who face articulation challenges. Hope (2020, p. 21) poses that merging text and visuals provides a synergy that propels imagination and creativity; and bridges the gap when complexities in articulation occur. The benefit of visual communication is undoubtedly assisting in language barriers; however, this should be an opportunity to develop and improve idea articulation, rather than a substitute or solution for language difficulties.

Consequently, mood boards should be a learning opportunity to assist students in developing their design articulation and vocabulary, by explaining what they intend to design, both visually and verbally. Cassidy (2011, p. 235) poses that experience is vital to the learning process and that "doing" proves to be the most valuable teacher as it enables new skill development, engagement with materials and requires students to take ownership of their projects. Ownership of the project is vital for innovation to take place, as it inherently contradicts notions of duplication.

Duplication of visual stimuli

Using design solutions (already designed garments) in the mood board becomes problematic, especially when students struggle with visual literacy. Rather than including their own voice into designs, students rely on these visuals to offer solutions, hindering design exploration and limiting the creative process. Designers undoubtedly use finished products or designs as inspiration, but how does one teach future designers to work beyond this inspiration? Inspiration should be a starting point or catalyst to design, and not an end-product in itself. Reproduction of visual stimuli occur intentionally and unintentionally. Often questions arise in a lecture, *how do I make this? I want to design this*, with a snapshot of a design on a smartphone. This instinctive question, innocently posed, is ensuing the act of duplication and not design. This opens the debate, are we educating designers or dressmakers?

Besides a need for a mind-shift, from re-making to designing, more complexities arise from this duplication problem. Students cannot replicate what is seen online, due to a lack of experience, knowledge, and resources, causing an emotional response of inferiority. Considering the South African context, students lack access to resources such as specialised textiles and machinery, as well as

finances. According to the *2021 NSFAS Status Report* (2021, pp. 3, 6), 839,130 applications were processed, and their budget increased from R441 million to almost R42 billion, since the fund was founded in 1999. The budgetary growth and number of applications reflect the financial difficulties of students. Besides general costs of higher education, the increasing costs of art and design materials have placed immense pressure on visual arts students. The lack of knowledge and financial restrictions result in students feeling discouraged, ill equipped, and inferior; however, their focus should not be to replicate but rather to innovate, reiterating the need for a mind-shift.

The proposed method of analysis does not aim to solve concerns of visual literacy, over-exposure to visual content or design duplication; however, it poses a low-tech method that could possibly alleviate pressures of these challenges. Consequently, it aims to propose a visual analysis method that provides guidance to students to think creatively beyond visual stimuli; provides analysis tools to simplify the understanding of what is seen (visual literacy) and through applying this technique, avoid duplication.

Research design of the proposed method

The proposed mood board analysis framework is grounded in an interpretivist view and follows an inductive process, where the design direction is deduced from the mood board to inform the design process. An interpretivist grounding is advantageous to the process as its ontological assumptions define the positionality of the mood board analysis. Although fashion research is often framed from a symbolic interactionist paradigm, when investigating its role in nonverbal communication (Kawamura 2020, p. 27; Lascity 2020, p. 78), Flick (2020, p. 28) poses that there is a close relationship between the two paradigms as both are framed from similar ontological assumptions. Interpretivism (Collins 2018, p. 42) and symbolic interactionism (Flick 2020, p. 28) rely on the ontological understanding that meaning is constructed socially, constantly changes and that multiple perspectives are omnipresent. Consequently, meaning is assigned because of the lived experience of the interpreter. The proposed mood board analysis requires the student to reflect on their perspective of what they see, which supports the ontological assumptions outlined by Collins and Flick. Therefore, the subjectivity of the designer cannot be avoided within the analysis. This, however, does not imply that the analysis should be unvalidated. Suggested validation techniques will be discussed within the proposed method.

Proposed method: textualising the mood board

Within fashion pedagogy, the mood board is often created in isolation, approached as a brief requirement, rather than an integral part of the design process. This siloed-approach perpetuates a disconnection between design-intention and design-outcome. This paper is proposing an analysis method to decode the visual content of the mood board into text that could act as design criteria. By interpreting the mood board into textual design criteria, the hope is to separate the act of visualising design solutions from found visual stimuli, to promote innovative design practices, without undermining the symbiotic relationship between the mood board and the design process.

By textualising the mood board, the students' focus is shifted away from visual stimuli, subsequently relying on memory, which is less defined. Santini (in Sikarskie 2020, p. 52) explains that visual memory is processed either fragmented or holistic. Holistic memory recalls vividly and emotionally but without detail, whereas fragmented memory recalls detail, disjoint from the complete image. Both forms of memory are beneficial in mood board interpretation as it avoids full recollection of the complete picture. By relying solely on memory, the mood board becomes inspirational rather than dictating, encouraging innovation, and addressing the challenge of duplication. Figure 2 illustrates the sequential process suggested.

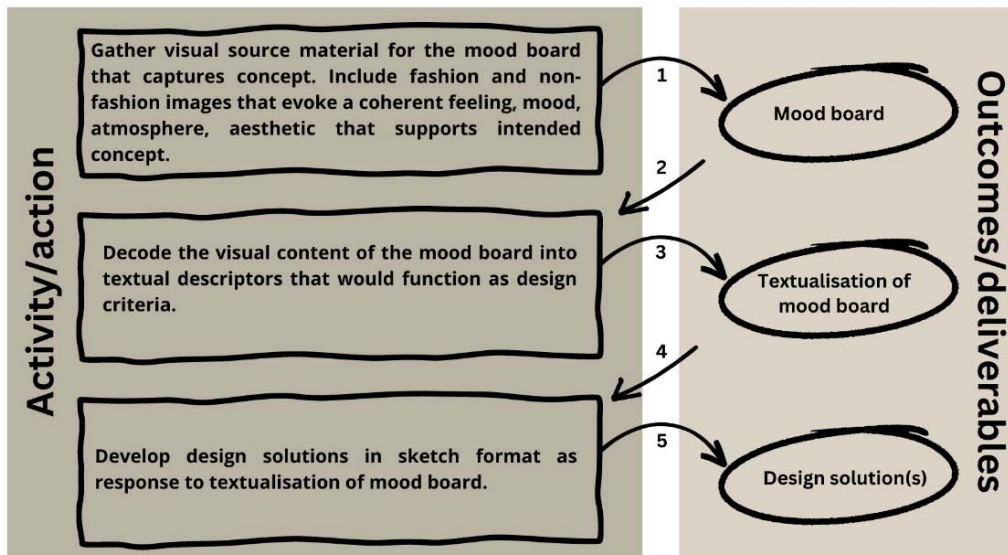


Figure 2: Sequential process of proposed method (developed by author)

Although this process might sound counterproductive, as it is proposing the conceptualisation phase to develop a “visual-text-visual” sequence, it provides intermediate steps to the design process. The intermediate steps hope to improve students’ visual literacy and encourage innovative design solutions, while still maintaining coherency to the design intention depicted in the mood board.

Barnard (2017, p. 73) poses a similar model in her research, where descriptors were assigned to collected visual data during first-cycle coding. The focus of Barnard’s research entailed designing ranges for participants based on social media fashion content. When comparing Barnard’s research to the traditional design process taught in fashion education, the online fashion content fulfilled the role of the mood board. Consequently, Barnard’s design process was reversed as design solutions acted as inspiration instead of a traditional mood board. In order to address this unconventional process, a visual analysis technique was employed, where images were analysed to develop textual descriptors. An extract of the method is seen in Figure 3.



Figure 3: First-cycle coding of visual data – Rue (Barnard 2017, p. 73)

The first-cycle coding produced a variety of textual descriptions the researcher observed and identified within the images. Barnard (2017, p. 73) applied second-cycle coding to the analysis where the first-cycle codes (Figure 3) were grouped into two categories: descriptors and colour palette. Within second-cycle coding the descriptors were synthesised to a limit of five descriptors, based on similarity and repetitive representation. An example of the second-cycle codes is seen below:

Table 1: Second-cycle coding for participant Rue (Barnard 2017, p. 73)

Participant	Descriptive words and phrases	Colour palette
Rue	Japanese aesthetic, Goth or punk, layering, simplicity, androgyny, balanced with suggestions of femininity	Shades from black to white

Barnard proceeded to design a fashion collection for the participant, solely using the second-cycle codes (Table 1), without consulting the images originally provided (Figure 3). The codes were validated through crosschecking textual feedback from participants to ensure that it aligns with the participant’s view of their personal style (Barnard 2017, p. 74). This paper proposes to apply a similar visual analysis to mood boards. This method requires engagement with visual data and poses the opportunity to integrate visual methodologies in students’ teaching and learning experiences. Antoine (2020, p. 117) poses another method, where redrawing components of the visual research is encouraged; however, he cautions against drawing finalised garments as this would limit creative thinking. The immediate response to visuals stimuli aims to foster engagement, comprehension, and appreciation of the creative value of source material (ibid.). In support, Barnard (2017, p. 74) explains that designing removed from initial visual stimuli enhanced creative practice, as the visual data became design guides rather than dictating the aesthetics of the design outcome, which in turn promotes creativity, innovation and prevent bias during the design process. Following this method underpins and supports

the purpose of the mood board, namely, to provide visual stimulus for creative thinking and problem solving (Apelund 2015, p. 97). Furthermore, it coincides with what this paper aims to offer through introducing mood board textualisation.

To ensure validity and apply a manner of control within the analysis process, sound criteria for analysis should be applied. Structured criteria provide a scaffolded approach to the textualisation, guiding learning practices. The intention is that over time, as students gain experience, improve visual literacy, and develop “intuitive judgement” (Cassidy 2011, p. 235), the criteria should adapt and adjust to accommodate their own personal design process.

Applying Barnard’s method in fashion design pedagogy requires adaptations to suit the purpose of teaching. In order to investigate the necessary changes, the following comparison was constructed (Table 2):

Table 2: Barnard’s research versus the proposed method

	Barnard’s research	Proposed method
Visual stimuli	Participant images	Mood board
Analysis process: First-cycle	Analysing images into text	Develop criteria to guide analysis process, suitable to undergraduate programme
Analysis process: Second-cycle	Categorising analysis into descriptors (maximum of five) and colour palette	
Validation	Compare descriptors to participants’ textual responses	Compare emerging themes to initial design intention
Outcome	Fashion collection depicting aspects of second-cycle coding	Fashion design adhering to specific design or project brief, and depicting aspects identified in analysis

Barnard’s method focused on content received from participants that only included finished designs. Student mood boards, in contrast, include non-fashion images. Students are encouraged to limit fashion images for mood boards, since the board should encapsulate more than just fashion, communicating and evoking emotion, mood, and atmosphere, highlighting conceptual content (Cassidy 2011, p. 229) rather than obvious design solutions. This in turn, would also avoid duplicating designs, intentionally or unintentionally. Student mood boards will include considered layout and presentation supporting the overarching design concept, whereas Barnard’s source material was seemingly unrelated fashion images found online. The process of creating the mood board would effectively function as a filter, removing outlining visuals that undermine the overall aesthetic intention of the concept.

As a starting point to guide students in textualisation, design principles and elements are suggested as a basis for analysis. Using the taxonomic system of art and design as criteria, allows students the platform to develop analytical skills and reiterate the importance of incorporating fundamental design elements and principles in the design process. Any form of art is constructed through a combination of these components (Field 2018, p. 1). Challenging students to re-evaluate visuals from the perspective of design elements and principles, students are encouraged to dismantle the images to its basic form. This categorically strips the layers of the mood board composition to unfold which design elements and principles, when used collectively, allow the creator to symbolically or conceptually communicate. This analysis will uncover the combination of principles necessary to evoke the desired response one hopes to achieve through the identified concept of the mood board. Antoine’s (2020, p. 117) suggestion of immediate redrawing could benefit this part of the process, to allow students to

focus on individual design components observed within source material. Arguably, this would only contribute if focusing on specific aspects, and not redrawing a full composition.

The traditional design elements and principles, although considered fundamental in art and design making, could evolve into in-depth decoding of images, such as Field (2018) has done in his book *An illustrated field guide to elements and principles of art + design*. For this proposed textualisation of the mood board to optimally function in the fashion pedagogy, it is important to equip students with an understanding of the fundamental design elements and principles (listed in Table 3).

Table 3: Design elements and principles (adapted from Field 2018)

Elements	Principles
Point	Balance
Line	Proportion
Shape	Contrast
Value	Rhythm
Form	Pattern
Texture	Emphasis
Space	Unity
Colour	Variety

The taxonomic system of art and design (Table 3) should be considered as a guideline that could be adapted and tailored to meet the need of the student, brief or institution. It is not meant to function as an ultimatum for analysis, merely to guide the student in decoding what is observed within their own mood board. For example, one specific element or principle might be more prominent than others or not contribute as strongly to the overall concept. The process should remain flexible, allowing the student's voice to emerge. Saldaña (2021, p. 74) suggests for visual analysis to use basic elements and principles as "primary codes" (i.e., line) and develop "subcodes" (i.e., curved) for each primary code to increase depth in analysis.

Once the mood board has been textually captured in a descriptive manner under the headings of the design elements and principles, the textual descriptors are synthesised where similarities are found. Commonalities and repetitive aspects shed light on the components that should receive more attention during designing. At this point in the method, the mood board should be removed. The textual analysis should be the only source of design direction. It is useful to apply validation methods after textualising is complete to ensure that the analysis supports the overarching concept and design intention.

Validation and trustworthiness of the analysis can be verified through applying qualitative coding methods. From the analysis similarities, commonalities and recurring themes should be identified. This could include versus codes or descriptive codes (Saldaña 2021, p. 174,134). From these codes, reoccurring aspects should unfold, demonstrating or symbolising similar ideas, indicating that themes are emerging (Saldaña 2021, p. 18). If the analysis is trustworthy, the emerging themes should support conceptual components of the initial design intention. For example, a mood board designed to communicate mental health issues, could reflect themes of fragility, vulnerability, and sombreness; opposed to a childhood innocence concept, which could reflect playful, fun, and colourful. If there is a disconnect, the mood board or analysis process derailed from the initial intention and implies that

rethinking and intervention is necessary to refocus the design process. However, if the textual analysis themes support the concept, the process of designing can commence.

Designing from the textual analysis only, the students should include design elements and principles identified in the analysis in their designs. For example, the identified subcode of organic line could be translated into curved panels. These identified components should become the active building blocks of garment designs. Through using the textual descriptors, instead of the mood board, innovative incorporation of design elements and principles can be applied.

This proposed method theoretically addresses the identified challenges and has been successfully applied in Barnard's (2017) research, however, evidence is still lacking to determine its feasibility in the educational space. Further research could shed light on possible adjustments necessary. The application of the taxonomic system as a basis of analysis could also be examined, specifically from the perspective of undergraduates, as additional criteria might be required to guide students that are less experienced in visual analysis.

Conclusion

Mood boards lose their primary purpose if not integrated into the design process. When considered as a project brief, isolated from the creation of design, it has no function and appears disjoint from the design solution(s) presented. Through literature, it is established that the role of the mood board lies in the conceptualisation phases of the design process, solidifying its place as an extension of the process and not siloed. Furthermore, it highlighted its function as a design catalyst aimed to fuel deeper creative thinking.

Through reflecting on teaching experiences, it was found that visual literacy, overexposure to design solutions and images, and replication of visual stimuli are challenges students face when engaging with mood board creation and application. The paper proposed to apply a visual analysis framework to the mood board that results in textual descriptors, rather than visual representation. This process translates the mood board's visual materiality to textual content. The analysis is framed from the perspective of art and design elements and principles, to provide structure to the analysis. It is proposed that the analysis process be verified through applying coding. Coding aims to draw parallels between the themes arising in the textual outcome of the analysis and the overarching design concept of the mood board. This verification process allows one to confirm if the initial design message is still conveyed, ensuring coherency throughout the design process.

The proposed taxonomic system as a basis of analysis can be tailored and adapted to the student, project, or institutional requirements as to best suit the aimed outcome. The textual outcome of the analysis, if deemed coherent with the design concept, then becomes the basis from which students should approach the design process. This ensures that the design elements and principles applied in the design solutions align conceptually and are coherent. The method addresses the challenges posed in the paper as follows:

- *Visual literacy*: the method requires student engagement with fundamental design concepts, to further their understanding of meaning making through visuals. The intermediate step to dismantle images into text provides opportunities to enhance articulation of ideas, especially for ESL students.
- *Overwhelming influx of visual stimuli*: applying a filtering system, such as the questionnaire developed by De Wet in Figure 1, students can systematically develop and enhance their intuition (Cassidy 2011, p. 325) in identifying relevant and coherent visual content.

- *Duplication*: the method encourages the act of designing to be removed from visual stimuli and only focus on textual descriptors.

By including this proposed textualisation of the mood board, the learning experiences of students can be enhanced as it indirectly addresses challenges that are often difficult to teach in a one-size-fits-all approach. The flexibility in analysis allows students to engage critically with visuals in a semi-structured method, encouraging innovative thinking beyond source material, while still balancing creative freedom with control methods to ensure validity.

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SESSION 5: Learning





Vulindlela – making new pathways

17th DEFSA conference – 21 | 22 September 2023

Decolonising speculative design: A South African perspective on design and futures thinking

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Abstract

Speculative design is being promoted as a critical approach to design. Speculative design does not attempt to predict the future. Instead, it attempts to create debate and discussion about preferable futures (Dunne & Raby 2013). Design educators and practitioners from the Global South have become increasingly critical of speculative design practices (Martins 2014). This paper provides an account of a speculative design project set for final-year students pursuing a degree in Digital Media Design at the University of Johannesburg, South Africa. The paper describes the project brief, the purpose of the assignment and the intended outcomes. Three student designs are presented and explored using a textual analysis methodology. The paper then draws on Anticipatory Systems Theory to unpack how Speculative Design education and practice can be augmented with alternative approaches the way Futures are used.

Keywords: Anticipatory design, decolonisation, speculative design.

Introduction

Tharp and Tharp outline four motives of design practice. Design for: 1) profit, 2) emancipation, 3) experimentation, and 4) discussion and reflection (Tharp & Tharp 2018). As such, Design Education should touch on all these domains. One of the central units in the Digital Media Design third-year course at the University of Johannesburg, South Africa focuses specifically on speculative design (SD). Students spend a semester learning about SD and working on a design project for the purpose of communication and reflection. Over the course of the semester, students attend weekly lectures and group sessions. They are introduced to the theory and practice of SD. Existing projects created by other designers are showcased and discussed. Students are then divided into groups. They are asked to think about a contemporary problem facing humanity and imagine what that might look like in fifty years' time. They must conceptualise and design an artefact that makes use of speculative technology. The artefact must describe this imagined future with the intention of invoking discussion about the issue they wish to reflect on. The final outcome of this project is a short film or video featuring the artefact and the scenario in which it is being used.

One of the intentions of running this project is that it may contribute to the practice of SD in the Global South. As a lecturer overseeing this unit, I noticed that while the quality of work produced was of an excellent standard, the outcomes were no different to the SD projects coming out of the Global North. In an attempt to address this issue, the project that ran during the 2022 academic year was tweaked

slightly and stipulated that the speculative scenario and artefact must address a local South African contemporary problem. Examples were issues such as corruption, load shedding, fees must fall, xenophobia, etc. It was exciting to see how students used their own local context to create SD artefacts. Unfortunately, for all intents and purposes, the project's final output did not change much. The imagined future scenarios and artefacts were a regurgitation of “used futures”. The only difference was that the scenes were set in South Africa. “Used Futures” is a term used to describe second-hand futures that inadvertently borrow possible and preferable futures imported from a foreign culture seen as worldly superior (Kwazema 2021; Sheraz, Inayatullah & Shah 2013; Sheraz 2021).

Speculative design and the future

SD does not propose to predict the future. It is a form of design that is provocative in an attempt to unsettle the present. In theory, it is a space to discuss the future before it happens as a way to avoid undesirable futures. It is a critical practice in that it highlights social, cultural, ethical, and political issues and offers alternative possibilities for our technologically mediated lives (Dunne & Raby 2013). Critical design movements try to employ critique as a means of bringing about change from within design.

Criticism has been levelled at SD for having Anglo-European biases in assumptions about the past and future (Mareis, Greiner-Petter & Renner 2022). Some of the issues brought up by scholars from the Global South point to the dystopian narratives that usually unravel in what is clearly a privileged Global North landscape. The cautionary tales of the future are the past and even the current reality of much of the world's population. The technology featured has only ever been accessible to the privileged (Prado & Oliveira 2014).

Design students in South African universities are predominantly educated through an epistemological standpoint from the Global North. This pedagogy forces the majority of students to view the world and themselves with dual identities – that of their own and that of the other (Ambala 2021). SD creates discussion about the present quite well by using the future to discuss a desirable or non-desirable future. It is not good at looking backwards for inspiration and, therefore, finds it challenging to present emerging futures that draw inspiration from the people, philosophies, and designs of Africa and its diaspora (Ambala 2021). Ideas about development, science, culture, and technology are framed through a Global North lens, and the notion of this vision of the future runs the risk of becoming epistemological colonialism (Fry 2017).

This paper suggests that anticipatory assumptions can “colonise” the future based on the forms of extrapolation that are used to prepare for the future (Miller, Poli & Rossel 2013). The paper showcases and explores three student projects. The projects are described in detail. The paper then employs a textual analysis through the theoretical lens of Anticipatory Systems (AS). AS is a theory of how complex systems function and adapt. It explains the mechanisms that facilitate dynamic agility in living systems. AS is non-deterministic and asserts that systems are not made up of a collection of individual elements. Systems are seen as relational models that have an inbuilt sense of self and non-self and embedded knowledge of past and future states (Rosen, J. 2022). AS Theory will help establish the role biases and assumptions play in anticipating the future. AS approaches will be proposed as a method for minimising the Global North biases that underpin speculative design education and practice.

Speculative design projects

Project 1: The Bubble

The Bubble is a speculative artefact from the future. It is introduced through an animated film that serves as a cautionary tale of what might happen within the sphere of energy production in South Africa should things not change dramatically. It alludes to the current energy crisis in South Africa, the looming climate disaster, and the technological developments within these spheres. The Bubble is intended to invoke a discussion about the broad class and wealth disparity in South Africa.

The Scenario

The year is now 2072. South Africa is still mining and using coal as its primary source of electricity production. Energy is also produced for export, making the rich richer and creating a wider gap between the rich and poor. Energy production methods have caused an escalation of extreme climate change. It has reached a point where the air is no longer safe to breathe. Infrastructure has collapsed, and there are no longer natural resources such as water and plants.

The Artefact

The speculative artefact (Figure 1) is a "bubble". The Bubble is an artificial environment that gives people of means (the rich) a way to escape the consequences of years of corruption and greed. The Bubble protects its citizens from the devastating effects of climate change.

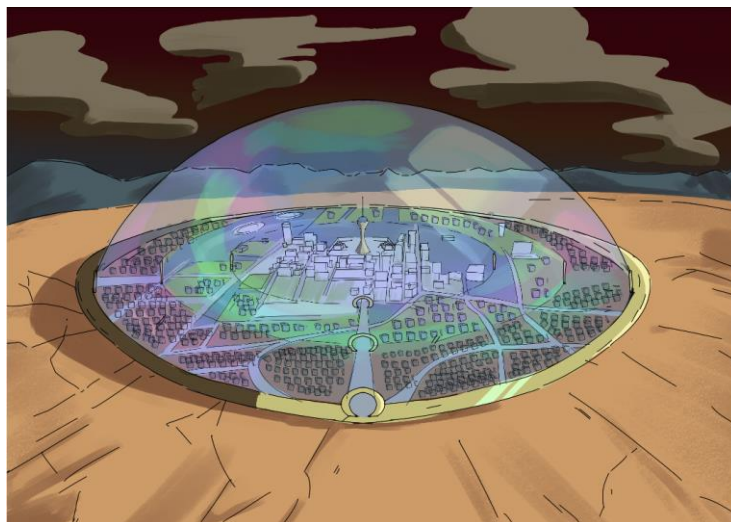


Figure 1: The Bubble

Outside the Bubble

The poor working class live outside the Bubble (Figure 2). They are left to eke out a meagre living by mining coal and working in an energy production facility. Most people capable of working do so in facilities that provide the power for the upkeep of the Bubble. Their meals are limited to one a day, and their electricity to 2/3 hours a day. Air quality is so bad that everyone must wear gas masks outside their houses.



Figure 2: Life outside the Bubble

Inside the Bubble (Figure 2)

There are three zones in the Bubble. Each zone is allocated to residents of The Bubble based on their class and wealth status.

Outer circle: The people living in the outer circle of the Bubble are physical labourers. Their jobs are for the upkeep of the Bubble. These are the street-sweepers, janitors, builders and the like. Workers can travel to other parts of the Bubble to work but cannot overstay a set number of hours. The air quality within this section is better than outside the Bubble – but not perfect. People are still required to wear masks at certain times when the smog is too much. They have access to more electricity – 5/6 hours a day – and have a bigger food allowance than people living outside the Bubble.

Middle circle: The upper-middle-class citizens live in this ring. They are generally professionals such as teachers, doctors, and engineers that maintain the infrastructure of the Bubble. Crops are grown in this circle. There are no food restrictions, and air quality is good enough that masks are not required at all. This section has electricity for 15/18 hours a day.

Inner circle: The wealthy elite and politicians reside here. There are no food or electricity restrictions in this circle. This circle has the clearest air, the best technology, and the greenest environment.



Figure 3: Life inside the Bubble

The functionality of the artefact

The Bubble uses advanced Internet of Things (IoT) technology to reduce greenhouse gasses in a set area. It reintroduces oxygen and clean, breathable air into the Bubble and blocks out harmful UV rays. It has a temperature control system that cools the area around the Bubble based on sensor input. Technicians use a digital interface to monitor the environment and adjust settings when needed (Figure 4 and 5).

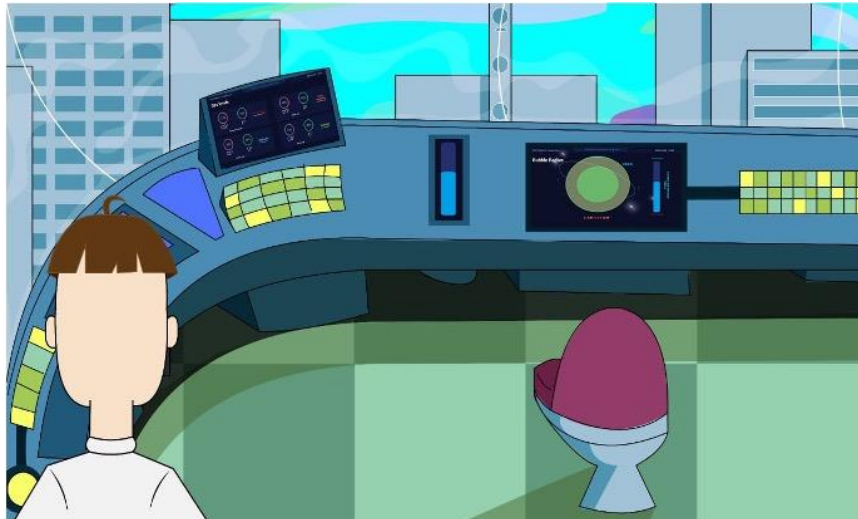


Figure 4: Technicians interacting with the digital interface



Figure 5: Digital interface

The final short film can be viewed on the following URL: <<https://youtu.be/h77osuDt81s>>

Project 2: Android police force

This project sets out to discuss the collapse of law and order and police brutality that emerged with the spike in protest action following the COVID-19 pandemic and the ensuing recession. Dissatisfaction with service delivery and anger at government corruption caused a rise in both legal and illegal protests. Violence, looting, and rioting became a common occurrence, and it was difficult for the police

to control the situation. Technology played a leading role in many instances Media captured live footage with drones, and on one occasion, a group of journalists were even attacked.¹ The project explores the complex double-edged sword technology wields by imagining a speculative future in which chaos is created and then stifled by technology.

The Scenario

It is 2072. Illegal protesting has reached dangerous proportions. Average citizens have easy access to advanced weaponry. The disruption has made governing very difficult. The South African government has launched a crime prevention programme using IoT technology. Drones and android killing machines can be activated in severe circumstances to prevent and stop protests (Figure 6). The response unit is strictly shoot-to-kill and can be activated by the president using biometric access control technology. This procedure can only be initiated by the cabinet. The president is the only one who can access the device controlling the search and kill network.

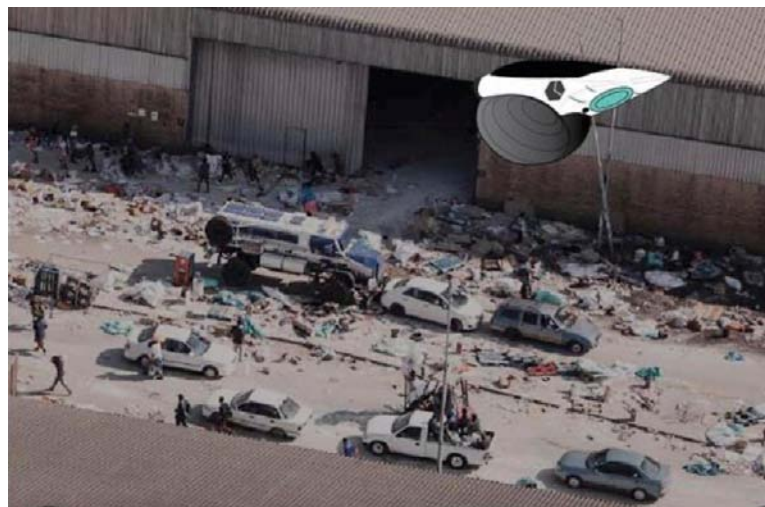


Figure 6: Crime prevention system

The Artefact

The artefact is a connected system of artefacts. Android soldiers form an advanced policing unit. Drones monitor the landscape and communicate with the androids and the electronic control centre.

The functionality of the artefact

Artefact Node 1: Android soldier

The androids (Figure 7) are fitted with advanced automated rifles, image recognition software, and sensors, all embedded to enhance their strategic and tactical functionality. The design is optimised to prevent and control criminal acts using extreme force.

¹ The students are referring to the 2022 Tembisa service delivery protests (Gumedé, 2022)

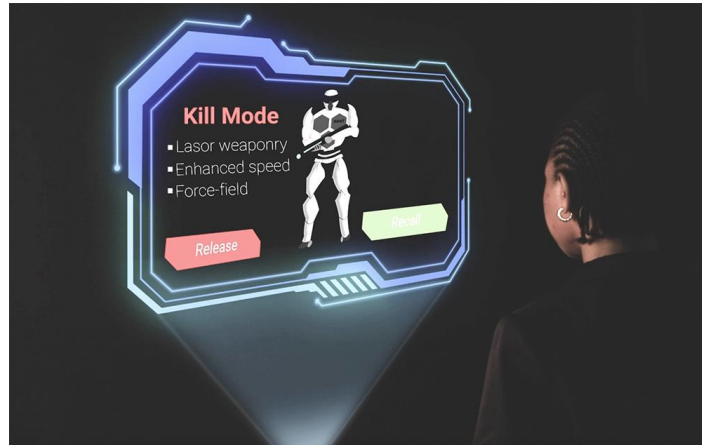


Figure 7: Android soldier being released

Artefact Node 2: Drone fleet

The drones (Figure 8) are conceptual eyes for the android soldiers. They use sophisticated video technology to capture and map cities and high-crime areas.

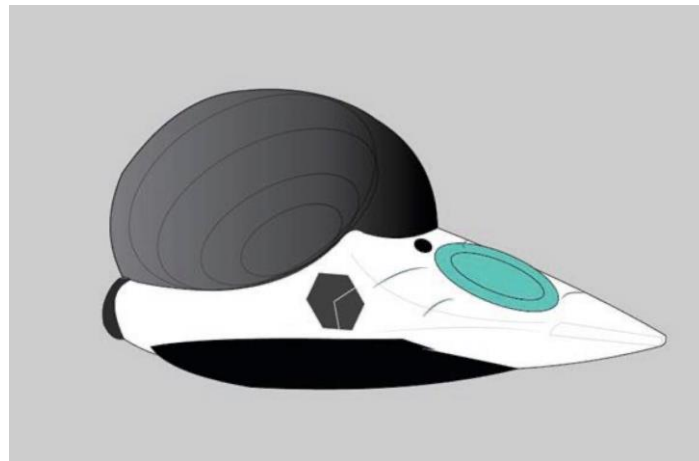


Figure 8: Design of the drones

Artefact Node 3: Control device and interface

An electronic device is concealed in a secure casing. It controls the system that is activated when the highest alert level is evoked. The device projects a digital interface (Figure 9) that humans can interact with to see the coordinates of problem areas, live footage of events, and the identity and personal information of the perpetrators. The interface can toggle between the various points of view from the built-in cameras embedded in the hardware of the drones and androids. Advanced calculations are processed to detect and identify the possible gathering of crowds and illegal activity.



Figure 9: Projected interface

The final short film can be viewed on the following URL: <<https://youtu.be/YhP538j72jE>>

Project 3: Lifeline

This project addresses the public health crisis in South Africa. It looks at various technology interventions that were used during the COVID-19 pandemic, as well as cyber-physical systems used for healthcare and other applications. The project proposes a workable solution to the crisis facing public healthcare due to years of government corruption. The artefact is presented in an infomercial promoting a new healthcare microchip device and promising an end to the crisis.

The Scenario

It is 2072. Fifty years have elapsed since the first COVID-19 pandemic. South Africa's public healthcare system has all but collapsed due to corruption and resource management. The government relies on international aid agencies, such as the United Nations, for health resource funding. The current authoritarian government has decided to save the day by outsourcing healthcare to a private pharmaceutical company called Atlas. They have developed an implantable microchip that is being promoted as the solution to the crisis and promises to change the face of healthcare forever. The government has made using this system mandatory for the greater good of the nation. Citizens who refuse to use this health chip will be denied access to public spaces (Figure 10).

The Artefact

Lifeline is a cyber-physical system that monitors people's health. A physical pill-looking micro-chip device (Figure 10) is injected into a person's body.

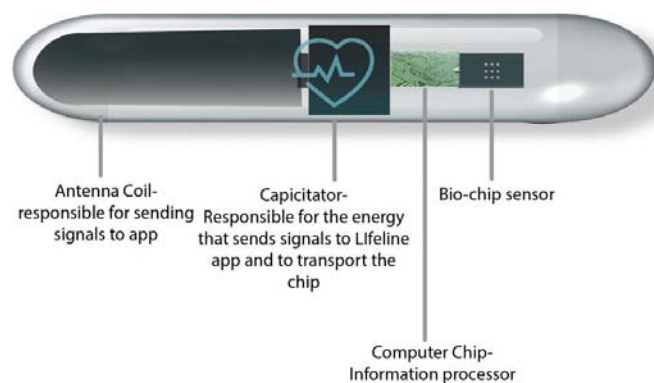


Figure 10: Lifeline chip

A digital barcode is then imprinted on the person's wrist (Figure 11), which contains information about when and where they were injected. There is a smartphone application that needs to be synced with the chip to provide feedback to the user regarding their health.

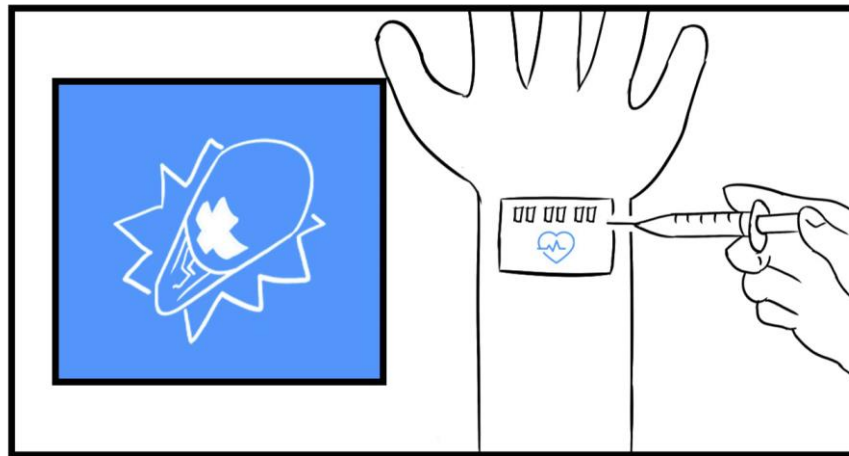


Figure 11: Lifeline barcoded access control RFID band

The Lifeline microchip contains a biosensor that collects health data from a person's blood. A microprocessor stores and interprets the incoming data. A capacitor stores the energy needed to transport the chip through the bloodstream. An antenna coil sends signals that can be read by the phone application and the RFID barcode. The application used advanced AI to identify new medical issues during the formative stages of the illness. It creates customised prevention, treatment, and recovery programmes based on each user's individual needs. In a situation where a person has contracted a contagious virus, RFID readers stationed in all commercial and residential buildings will be able to track the exposure and spread of the illness.

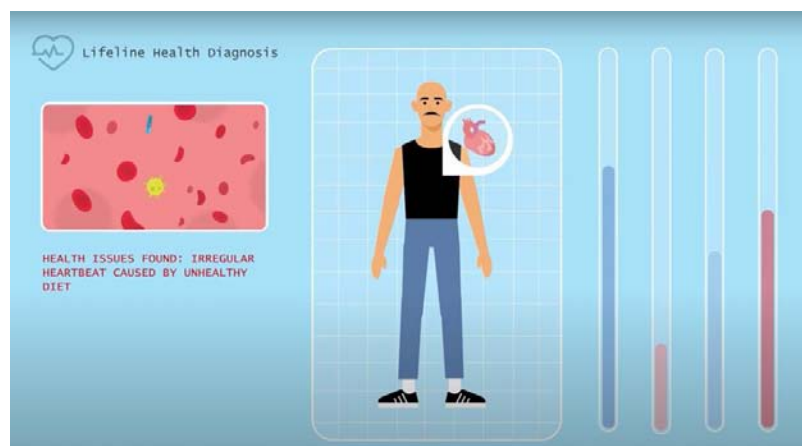


Figure 12: Lifeline system monitoring the body

The infomercial can be viewed on the following URL: <<https://youtu.be/ryPYIn6TvF4>>

Emerging themes

There were four key themes that stood out in the overall reflection of these three films. 1) The future scenarios depicted were either dystopian or utopian. 2) There were implicit assumptions that what happened in the past will happen in the future. 3) The future was viewed from a techno-centric perspective. 4) The narratives suggested that only people in power have agency in highly complex socio-technical contexts.

Anticipatory Systems Theory

Roberto Poli differentiates between an ability to anticipate for the sake of responding and planning and the systemic nature of anticipation present in anticipatory systems. As illustrated in Table 1, the future is anticipated in various ways. Anticipation can be explicit or tacit, open or closed, conscious or unconscious. We know that we can consciously plan and predict. Nevertheless, layers buried beneath our conscious awareness are involved in anticipation (Poli 2010). Adaptive complexity is built into all living organisms in the form of "anticipatory" systems. The organisation of the relational elements defines anticipatory systems. Because time always stands between cause and effect, anticipation is built into the very nature of adaptive systems. The present state of a system is composed of both the past and future state of the system, meaning that the system has an embedded knowledge of self and non-self (Rosen 2011). From within the sphere of human-computer interaction and cybernetics, anticipatory systems encompass a plurality of future possible states. Quantum entanglement is a metaphor used to describe multiple possible future states existing at the same time in the present. This model acknowledges the limitations of linear reasoning with cause-and-effect-based calculations (Nadin 2016). When it comes to human and social systems, future states are primarily determined by choices made by agents. Agents make decisions based on what they deem to be desirable or undesirable. Therefore, decisions about the future are determined by the frame of reference of the decision-maker (Fuller 2017). Assumptions and biases create narrowness in how the future is conceived. There needs to be more awareness of the assumptions and frames for imagining the future. There is a pre-scripted set of future imaginings influenced by history, social structures, and current reality, but also by chance, innovation, and human choice (Miller 2018a).

Table 2: Taxonomies of anticipation

Anticipation for planning	Anticipatory systems
Explicit (predictions and expectations)	Implicit (unknowable and emergent)
"Good" and "Bad" futures	Nuanced/contextual
Linear temporal causality	Dynamic and adaptable

Anticipatory Systems (AS) can be more closed or more open. If anticipation is used for forecasting and predicting, it functions more as a closed system constrained by probability and desirability. In contrast, living systems anticipate in a less conscious and constrained fashion. Social systems share some of these non-conscious anticipatory qualities that factor in evolving and emerging realities (Miller 2018b). When the future is used to surface ideas and novel discussions, the degree to which the AS is open affects the premisses relating to agency in practical choices. These assumptions influence the next-level assumptions that follow. Using anticipation to discover new ways of thinking about issues demands that AS be less deterministic in how change is conceived (Miller 2018b; Poli 2001). Exclusive use of critique in communicating and discussing desirable or undesirable futures closes room for agility and flexibility, which is necessary for transformation. Critique implores immediate action to avoid risk and uncertainty. This attitude leads to the framing of the future in terms of "good" or "bad", which in-

turn limits human agency and makes it difficult to see the layers of complexity and possibilities for transition. AS is a theoretical paradigm that helps use the future as a tool for sense making in the present. From this perspective, the future is not a "problem" to solve and conquer. Instead, it is a tool for exploration and experimentation. Acknowledging the dynamic nature of complexity creates an unpressurised space for confronting ambiguity and uncertainty without fear, which increases human agency (Miller 2018c). Within an African context, desirable futures are often conflated with visions of industrial catch-up and convergence and state-centric visions. Framing the future in this way resembles used and past futures imposed on Africa by colonial and neo-colonial influences. It is difficult to break away from visions of the future that do not involve conquering and ruling or Cold War planning paradigms (Karuri-Sebina & Miller 2018).

Thematic analysis

Reflecting on the topics discussed in student projects, the four consistent themes in the fictional future scenarios map neatly to the anticipation for planning and responding. As seen in Table 2, the ideas communicated by the fictional future narratives speak to planning-based anticipatory proficiencies, which are borne from expectations and value-based judgments and assume bounded causality.

Table 3: Common themes in the fictional future scenarios mapped to modes of anticipation

Themes	Anticipation for planning	Anticipatory systems
<ul style="list-style-type: none"> • Techno-centric • Only people in power have agency 	Explicit (predictions and expectations)	Implicit (unknowable and emergent)
<ul style="list-style-type: none"> • Dystopian /Utopian Scenarios 	"Good" and "Bad" futures	Nuanced/contextual
<ul style="list-style-type: none"> • What happened in the past will happen in the future 	Linear temporal causality	Dynamic and adaptable

Table 3 links the thematic analysis of the films to Anticipatory Systems Theory. The presented projects' themes fall into the anticipation for planning category. This may be useful in some situations. However, it is not the best method to decolonise our imaginations.

Table 4: Thematic analysis

THEMES	The Bubble	Android Police	Lifeline
<ul style="list-style-type: none"> • Techno-centric • Only people in power have agency 	Government has all the power and technology will be the main driver of the future – industry in the 4IR will look like the 3IR	"Terminator /Transformer" metaphor Abuse of power	Technological progress is a given. Only government can harness it
<ul style="list-style-type: none"> • Dystopian/Utopian Scenarios 	There is only dystopia or utopia – the future must be good for some and bad for others	Dystopia with killing robots is the inevitable outcome of technology evolution	The "greater good" can create a Utopia even at the expense of personal freedoms
<ul style="list-style-type: none"> • What happened in the past will happen in the future 	A class system has always existed and will therefore always exist	People in power have all the power and will always have power	Autocracy will stop chaos

The observations from this analysis are by no means a criticism of student work or the value of SD. They do bring attention to aspects of instruction in SD that may need consideration when attempting to decolonise design education.

Project 1: The Bubble

This project is an excellent expression of a critical SD agenda. SD props are used to challenge ideals and beliefs and imagine alternative possibilities (Dunne & Raby 2013). The Bubble is quite effective as a trigger for critical reflection. It helps the viewer engage with ideas about class and wealth disparity and question prevalent ideas about how technology will prevent the consequences of industrialisation, such as the climate crisis. It creates a space to think about South Africa's response (or lack thereof) to climate change and the power structures that come into play. It points to classism, capitalism, exploitation, and technological determinism. The dystopian scenario depicted is a cautionary tale of the dangers of capitalism and technological progress. While this scenario talks to many current problems facing South Africa, it could be situated anywhere in the world. The film presents a colonised version of an industrialised future in which technology is the primary driver of change. It also focuses on the agency of the powerful. The socio-technical system depicted emulates normative ideas about progress being good for some and bad for others and assumes the class-based system embedded in colonialism will continue to exist forever in all contexts.

Project 2: Android police force

The technologically advanced policing system depicted in this project strongly resembles past versions of the future. Technological developments have created killing machines that the people in power are misusing. Set within the context of the social unrest in South Africa, the project is unsure of its stance on this type of technological innovation. On the one hand, it is presented as an answer to the real problems brought about by the riots and criminal activity that transpires regularly. On the other hand, it depicts a dystopic use of robotic policing technology. It indeed prompts a discussion about the importance of law and order and, at the same time, offers a critique of the policing and crowd control measures that are used within a South African context. It could also just as easily be applied to many other contexts worldwide, both in the Global North and South. The Terminator/Transformer metaphor is nested in a Global North worldview of the future, which assumes that technology will inevitably be misused and that power will be abused indefinitely.

Project 3: Lifeline

This project is slightly different to the first two projects. While not entirely utopian, it has utopian underpinnings that promote a technological determinist view of progress. The ideas presented in this project open some exciting avenues for discussion and reflection. It prompts questions about what is justifiable in the name of the "greater good" of society. It looks at modes of governance and the advantages and disadvantages of authoritarian rule. It evokes ambivalent feelings about technology, privacy, progress, and health policies. It indeed invites debate and critique. This project touches on issues of neo-colonialism, but simultaneously, it resembles the universal conversations arguing for and against non-democratic forms of governance. It assumes people in power are the best-suited candidates for change making and technology harnessing.

Conclusion

The theoretical concepts emerging from AS Theory give clues as to why the SD projects failed to provide unique Global South perspectives. The way the future is being used within SD creates a set of rules that make it difficult to re-imagine possible futures that account for different and diverse ways of imagining. Using the future for critical debate establishes a set of assumptions that make the anticipation more closed-looped. Critique implies providing, in most cases, a negative judgment (Cambridge Dictionary 2023). Using critique in SD promotes value-based judgement about what

"good" and "bad" futures entail, which makes it easy to draw on used or past futures that tend to view possible futures through the lens of utopian or dystopian scenarios. Reflecting on this research has led to a set of considerations for new directions in teaching SD in South Africa. Table 4 proposes theoretical aspects of AS that could be introduced into the construction and framing of the SD project going forward.

Table 5: Findings and reflections

Anticipatory systems	New pathways for speculative design futures
Implicit (unknowable and emergent)	The future is uncertain – reacting with fear reduces individual agency
Nuanced/contextual	Employing “used futures” colonises the future
Dynamic and adaptable	Using the past as a template for the future is not useful as the future is emergent

Using a more open-looped approach to how the future is used creates a space to experiment with the future without casting judgment about what the future should look like. As stated before, the history of colonialism and neo-colonialism makes it easier to imagine the future by using our default vision of a preferable future, which usually promotes industrial catch-up and convergence or state-centric idealism.

The findings extracted from the thematic analysis of the three SD projects presented in this paper propose additional considerations that may be valuable for design educators in South Africa.

Before students conceive ideas about speculative futures, educators should facilitate conversations about how our visions of the future have been colonised. New methods for unearthing anticipatory assumptions should be explored. Uncertainty should be embraced as a space for experimentation and making sense of novelty. Complexity should be acknowledged and embraced for the emergence of agency and resilience. New ways of framing the future should be explored, and imagination should be given free rein to create visions of better futures.

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Appreciative inquiry in design research: A case study from interior design

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Abstract

In the 2021 publication, 'The Ontology of Design Research', Miguel Angel Herrera Batista argues that the ongoing development of postgraduate programmes in design has led to a growing focus on establishing the field of inquiry as an independent and differentiated research area. For design research to contribute to disciplinary development, researchers need to focus not only on procedural rigour but also on ensuring that the philosophical foundations of selected methodological approaches align with the ontological reality of design. It is, therefore, necessary to encourage postgraduate students to investigate both familiar and novel research methodologies in the search for appropriate approaches to design research projects.

Appreciative Inquiry (AI) is a research methodology developed in the late 1980s to reveal often overlooked, positive aspects of experience. AI is grounded in the theory of social constructionism. It focuses on understanding processes and experiences, and on creating alternative opportunities and ways of viewing situations and problems. AI typically follows a four-stage approach: 1) Discovery (appreciating and determining the best of what is); 2) Dream (identifying what might be and envisioning results); 3) Design (determining what should be and co-constructing change); and 4) Destiny (developing ways to achieve the vision). AI is commonly used as a research tool in fields such as management studies, education, healthcare, and social work, to study and improve the effectiveness of interventions and programmes.

The paper presents an MA Design (with a specialisation in Interior Design) research project as a case study to investigate the application of AI as a methodology in design research. The case study illustrates that, although AI has not been used extensively in design research, it offers opportunities to investigate under-researched topics in the design disciplines. AI is especially valuable in areas where processes and strategic thinking may be implicit and not yet formally described. In addition, the method's future-focused, collaborative approach aligns well with the speculative nature of design thinking (ideation & prototyping) and the anticipatory mindset encouraged during the design process. The paper makes recommendations for future applications of AI in design research. The paper postulates that by encouraging students at the master's level to explore novel methodologies, design researchers, and by extension design practitioners, can gain deeper insight into design processes and build on the experiential knowledge of professionals to expand the theoretical base of the design disciplines.

Keywords: Appreciative inquiry (AI), design research, design thinking, interior design, research methods.

Introduction

Like many vocational and practice-oriented fields, design seeks to establish itself as an academic discipline. Disciplinary legitimisation calls for the development of a specific knowledge base and the establishment of distinctive forms of communication and practice that helps to distinguish designers from other professionals. Scholarly design research plays a key role in aiding disciplinary development. Systematic research in design promotes academic disciplinary development and allows for the construction of solid conceptual structures that guide professional practice (Batista 2021, p. 2). Feast (2010, s.p.) refers to the relationship between practice and research as a 'knowledge-building cycle' that helps to convert tacit and experiential knowledge into explicit theories that can be "shared, contrasted, tested, and reflected upon". Experience with research strategies and methodologies can provide designers with the ability to generate knowledge across projects and can inform better design solutions by enhancing design thinking (Vaux & Wang 2021, p. 2; Groat & Wang 2013).

Batista (2021, p. 2) states that inquiry has always been an inherent part of the design practice but that design research sometimes lacks the rigour that postgraduate programmes and contemporary society require. In addition, postgraduate programmes often adopt research methods from other disciplines without prior reflection on the philosophical foundations that sustain them and evaluation of their relevance to the study of the 'reality of design' (Batista 2021, p. 2). Horváth (2007, p. 10) argues that systematic academic enquiry is supposed to explore and aggregate knowledge with sufficient veracity and construct research methodologies and methods applicable to the field. For design research to contribute to disciplinary development, researchers need to focus not only on procedural rigour but also on ensuring that the philosophical foundations of selected methodological approaches align with the ontological reality of design.

The paper considers the disciplinary identity of design research to broadly establish what differentiates the field of inquiry as an independent research area. This study's design research is positioned in the context of postgraduate education. The paper considers the value of exploring novel methodologies, such as Appreciative Inquiry (AI), in postgraduate design research to aid in scholarly identity formation and expand the theoretical base of the design disciplines.

The disciplinary identity of design research

In the publication, 'The Ontology of Design Research', Batista (2021, p. 33) argues that the systematic and ordered study of a specific 'reality' or 'phenomenon' is the foundation of every research process. Design research, therefore, aims to study the ontological elements that comprise design, namely the designed object, designer and user, as well as the interactions between these. In addition, design research considers how the temporal, social, and spatial contexts affect these elements. The reality of design is complex, as it embodies both the social processes of creation and use and the inanimate products of these processes. Design research is either focused on the professional practice of design to improve products, services, or experiences; or on studying the design discipline and developing its theoretical base (Batista 2021, p. 11, 22). Whilst both research areas generate knowledge, the latter is typically positioned in the academy where dissemination of knowledge is a fundamental goal. As such, it is characterised by peer oversight and evaluation, adherence to ethical protocols, and the development of more rigorous research frameworks to guide the process.

In academic research, the researcher adopts a specific position or worldview, known as a 'research paradigm', which frames the study and bases the research process epistemologically and methodologically. Guba and Lincoln (1994) distinguish four dominant paradigms in research: the positivist; the post-positivist; the critical theory; and the constructionist. Batista (2021) argues that the complex reality of design cannot be addressed fully by any of these paradigms and presents pragmatism as an alternative philosophical approach to design research. He argues that "philosophical pragmatism can offer an adequate perspective for design research given that [...] it is based on daily experience and action habits, which is fundamental in the practice of design" (Batista 2021, p. 128). In this paradigm, design research emphasises the practical effects of ideas; research leans towards what works and what is useful; and abductive reasoning is employed to generate new ideas based on intuition and daily experience.

Feast and Melles (2010, p. 1) indicate that there are three main theories of design practice, namely, direct making, reflective practice, or rational problem-solving, that broadly correspond with the subjectivist, constructionist and objectivist epistemologies that guide design research:

The subjectivist position [...] argue[s] that all practice is research and that a thesis (written text) is unnecessary as knowledge produced through research may be read in the artefact (Frayling, 1993; Candlin 2000; Prentice 2000). The constructionist position holds that designing in itself is not research unless it is also accompanied by reflection upon the process of making (Cross 2001; Dorst 2008). The objectivist position emphasises the logical construction of theories based on discrete empirical facts (Friedman 2003; Owen 1998; Biggs & Büchler 2007).

These positions are not exhaustive but represent several seminal authors' stances on design research and its link to design practice. According to Feast (2010, p. 2), the epistemological positions locate design in either 'isolationist' or 'situated' relationships with other disciplines. The isolationist position presents design research as uniquely different from research conducted elsewhere, whereas the situated position maintains that design should seek commonalities with the larger academic community. In both instances, the methodological approach and data collection methods must align with the assumptions that the study makes about human knowledge, artefacts, and the interpretability of research findings. The field of design research is characterised by methodological diversity. Philosophical pragmatism favours mixed-method research, but this is not the answer for all research studies. Plurality and variety are typical of a developing field of inquiry but can create "multiple points of confusion for those preparing to conduct research in design" (Matthews & Brereton 2015, p. 152).

Design research in postgraduate education

Scholarly design research is by no means the exclusive domain of higher education, but postgraduate study is often the designer's main introduction to the purpose, nature, norms, and processes of design research. At the undergraduate level, curricula in design disciplines tend to be modularised, with 'design process' and 'research process' practices dealt with independently. At the postgraduate level, students enrolled in coursework programmes are expected to integrate these two practices, whereas students enrolled in research-focused programmes are expected to conduct research as independent scholars. There may be variations to this model, but by and large, postgraduate programmes place a greater emphasis on research design, methodological rigour and academic writing practices than is typically required at the undergraduate level.

Students may find it challenging to transition from the literacy practices of the collaborative, trial-and-error-based studio environment to the independent, scholarly environment of postgraduate study. Melles (2008, p. 262) argues that developing academic disciplines and practice-oriented fields such as design are often under pressure to conform to the dominant academic literacies and processes of the larger academy. One can argue that the design discipline's drive to legitimise its existence in academia leads to a disregard for the multiple literacies developed during earlier design education and professional experience. Unfortunately, the supervisory process often overlooks the disciplinary specificities of design practice in favour of academic enculturation.

The identity of the design researcher

Postgraduate design education is approached with a dual goal: on the one hand, it serves to develop the knowledge base of the design discipline(s) through systematic research; and on the other, it serves to develop the scholarly identity of the designer (student). Philpott (2015, p. 63) states that many professional doctorate students have no desire to become academics and that they aim to be 'scholarly professionals' rather than 'professional scholars'. We argue that this also holds for many postgraduate design students. In research-focused programmes, such as a Master of Arts (MA) qualification, students often continue to work part-time in the design industry whilst studying. In the design disciplines, there is not necessarily a direct link between gaining a postgraduate qualification and professional advancement. This likely indicates that students seek what Philpott (2015, p. 61) refers to as 'professional renewal' – a search for revitalising personal practice or obtaining a different perspective on professional practice. Barnacle (2012, p. 82) argues that producing academic text involves 'text work' and 'identity work'. The latter refers to the process of discovering an authoritative voice related to the discipline whilst mediating the 'practitioner-researcher-self' conjunction. Successful identity development in postgraduate design study demands consideration of the researcher's designerly identity during the supervision practice.

The design disciplines are characterised by the concept of 'design thinking', which embodies a set of cognitive approaches, mindsets, and practices that guide how designers approach problems. As such, design thinking underscores teaching and learning strategies in higher education. Dorst's (2010) research on the nature of design thinking positions designers' cognitive approaches as fundamentally different from that of fields based on analysis and problem solving. According to Owen (2007, p. 17) "design thinking is in many ways the obverse of scientific thinking. Where the scientist sifts facts to discover patterns and insights, the designer invents new patterns and concepts to address facts and possibilities". Designers follow abductive reasoning processes, i.e., solution-focused thinking processes that simultaneously involve problem solving and reframing the problem. Design thinking is characterised by integrative thinking to bring competing constraints into balance, leading to experimentative and explorative, even optimistic mindsets. Hassi and Laakso (2011) identify visualising, thinking by doing, collaborative work-styles, and human-centred approaches to problem solving as some of the most recognisable design thinking practices. Design thinking is a non-linear, iterative process that typically involves four phases – 'Empathise', 'Ideate', 'Prototype' and 'Test' (Figure 1). Designers immerse themselves in the context of the design problem to develop a variety of potential solutions. These are made tangible through visualisation or physical prototyping to test their viability. The cycle of immersion, disruption, and innovation is repeated to arrive at a solution that best addresses the unique aspects of the context.

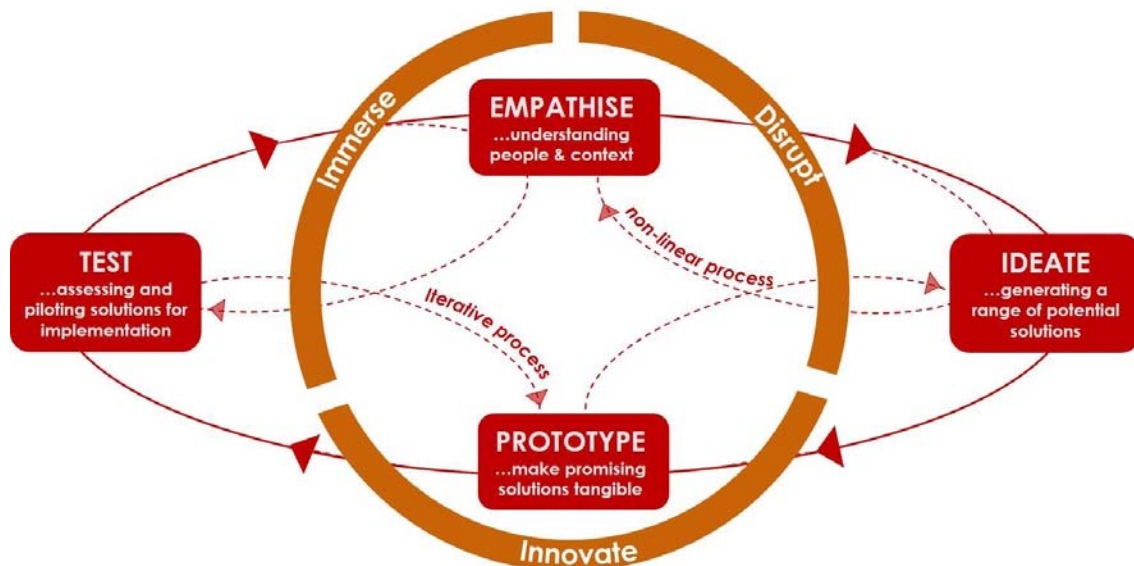


Figure 1: The non-linear, iterative process of design thinking (adapted from models of the Hasso-Plattner-Institut School of Design Thinking (2023), IDEO (2023), the Institute of Design at Stanford (2010), and the Interaction Design Foundation (2016))

Vaux and Wang (2021, p. 1) indicate that designers find learning about research methods challenging. The incremental, procedural approach may appear contrary to the non-linear designerly process of approaching a project as a unique challenge that requires a distinctive solution. Matthews and Brereton (2015, p. 152) echo this when stating that "methodological concerns can be paralyzing for novice researchers" as it can seem that one has to become an expert in philosophy before starting the research project or that one has to commit to one methodological tradition and work solely within it. Procedural determinism is unfamiliar territory for designers and not in keeping with the flexibility and solution-driven approaches to problem solving encouraged by design thinking. In order to develop the designer's scholarly identity, we should aim to align research practices as far as possible with design thinking. The goal is to build on previous experience and embedded literacies and to provide the novice researcher with a framework of experiences that can be translated into practice. Research methods that align with the characteristics of pragmatism present opportunities for improved methodological alignment in the postgraduate research process. We argue that it is necessary to encourage postgraduate students to investigate both familiar and novel research methodologies in the search for appropriate approaches to design research projects.

Appreciative inquiry

Appreciative Inquiry (AI) was developed in the late 1980s by Cooperrider and Srivastva (1987) as an affirmative form of inquiry to complement conventional forms of action research. AI aims to reveal often overlooked positive aspects of experience and is positioned in opposition to conventional, problem-driven research (Clouder & King 2015, p. 2). Cooperrider and Srivastva (1987, p. 147) argue that problem-solving research assumes that something is broken and that it needs to be fixed. The researcher is positioned as an 'objective third party' who is discouraged from speculating or acting as a 'utopian thinker'. In contrast, AI focuses on understanding processes and experiences without automatically phrasing a situation as problematic. Clouder and King (2015, p. 3) argue that "Cooperrider and Srivastva (1987, p. 129) saw rehearsing problems as constraining human imagination when new ideas were the force for change and social innovation". AI is therefore viewed as an enabling agent of social transformation, specifically organisational change. The following five

principles form the basis of AI (Clouder & King 2015, p. 3; Cooperrider & Whitney 2001, p. 14-17; The Center of Appreciative Inquiry 2023):

- *Constructionist (words create worlds)*: reality is socially constructed through language and interaction. The action of inquiry generates an understanding of future possibilities;
- *Simultaneity (inquiry creates change)*: inquiry is an intervention, i.e., change begins at the inception of inquiry and continues via the questions we debate;
- *Poetic (we can choose what we study)*: what we choose to study influences what we discover. Daily discourse constantly recreates the story of an organisation and, like a poem, interpretations are endless;
- *Anticipatory (image inspires action)*: human systems move in the direction of their images of the future, i.e., behaviour is influenced by the images of the future that we collectively imagine;
- *Positive (positive questions lead to positive change)*: momentum for change requires positive thinking which is best generated through positive questions that amplify the positive core.

It is important to acknowledge that an inquiry that seeks positive experiences "may be perceived as restrictive and uncritical in the academic world" (Clouder & King 2015, p. 3). AI practitioners distinguish between deliberately choosing a positive starting point to initiate an inquiry and disregarding negative and difficult experiences to achieve a predetermined naïve ideal. AI aims to create an environment where people can speak freely without feeling the need to justify or defend experiences. AI practitioners acknowledge that the resultant research will be 'partial' in some sense, but one can argue that no research methodology can claim to uncover all perspectives of a set of experiences. Clouder and King (2015, p. 11) suggest that AI can engage more holistically with the complexity of the research domain if the researcher adopts a reflective and reflexive approach to the facilitation process. This requires some affirmatory facilitation experience or, at the very least, consultation with experienced AI practitioners.

AI typically follows a four-stage approach: 1) Discovery (appreciating and determining the best of what is); 2) Dream (identifying what might be and envisioning results); 3) Design (determining what should be and co-constructing change); and 4) Destiny (developing ways to achieve the vision). The 4-D Model, as it is known, was later expanded by Watkins, Mohr and Kelly (2011, pp. 36, 37) to include 'definition' (planning the interview structure and questions) as a preceding stage (Figure 2).

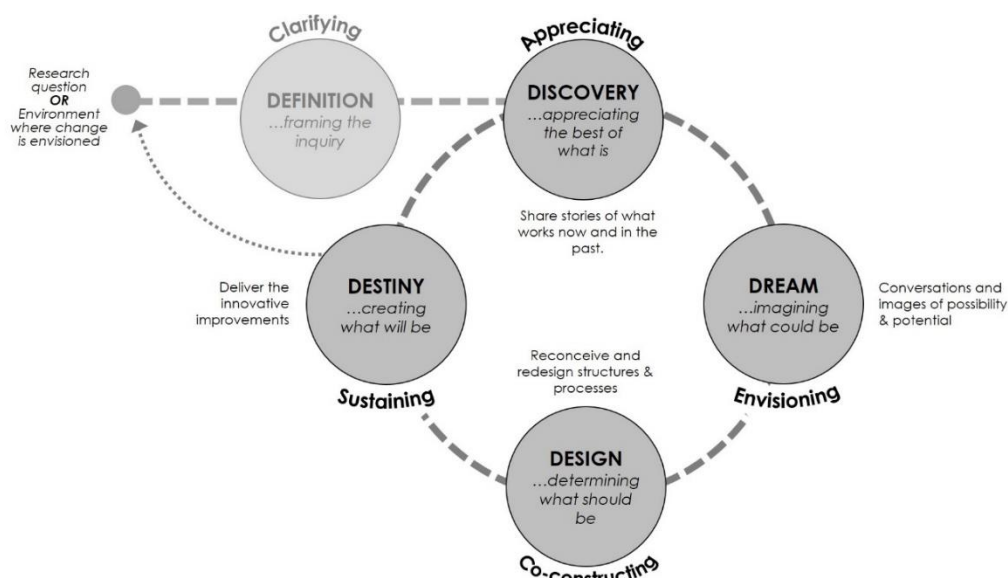


Figure 2: The 4-D Appreciative Inquiry Model, with the addition of the definition stage, adapted from (Cooperrider & Whitney 2005, p. 43)

AI was originally developed to investigate and initiate organisational development, especially in the corporate environment. It has subsequently been used as a research framework in fields such as management studies, education, healthcare, and social work, to study and improve the effectiveness of interventions and programmes. Ideally, AI should complete all four stages to initiate change. However, AI can be used in alternative ways as a research tool if organisational change is not the researcher's aim. Michael (2005) used AI as an interview protocol by conceiving her research as a "mini-version of the Discovery phase of the appreciative framework". Michael (2005, pp.226-228) relays that three clear benefits emerged throughout the 60 interviews she conducted: 1) interviewees were eager to tell their stories; 2) interviewees offered dynamic and unrehearsed information; and 3. interviewees spoke more openly, with less defensiveness or fear of reprisal. Although the discovery stage was isolated from the other three stages of the full AI cycle, Michael (2005, p. 229) indicates that respondents were naturally drawn towards 'dreaming' of change as the interviews progressed. An appreciative interview framework can empower participants to consider change, even if this is not the researcher's aim. Michael's experiences with AI indicate that it has the potential to be used successfully as a stand-alone research tool.

AI and design thinking

AI is grounded in the theory of social constructionism and has been aligned with action research (AR) from its initial development. It is theoretically grounded and oriented towards practical knowledge and pragmatic action-oriented research. Therefore, we can position AI as a solution-oriented research paradigm that reframes problems as potential opportunities. Similarly, designers use 'solution-focused cognitive strategies' (Lawson 1979) to develop innovative approaches to ill defined or 'wicked problems'. AI's future-focused, collaborative approach aligns well with the speculative nature of design thinking and the anticipatory mindset encouraged during the design process. Two recent articles (both focused on enhancing educational practices) presented AI and design thinking as analogous appreciative frameworks (Buyarski 2021; Sriharan, Smith, Shea & Berta 2021). Figure 3 highlights some of the commonalities shared between AI and design thinking by overlapping the stages of both processes.

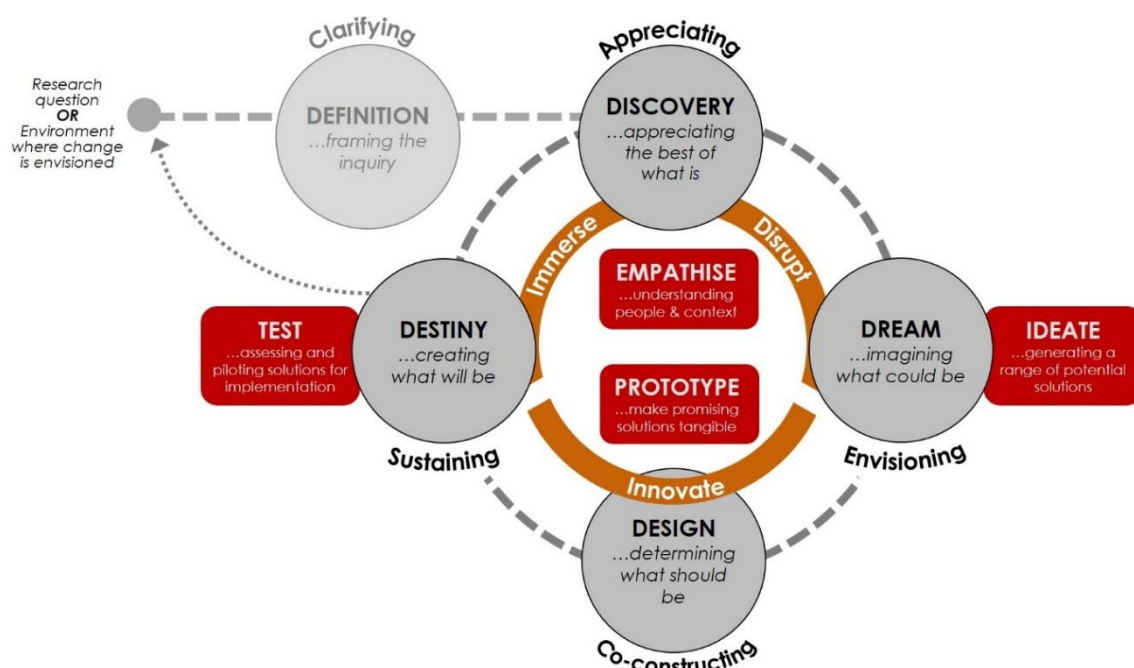


Figure 3: The 4-D Appreciative Inquiry Model as analogous to design thinking

Both AI and design thinking centralise the process of asking questions in a safe, collaborative environment to uncover assumptions and unstated perspectives on a current situation. In addition, both approaches focus on stimulating free thinking to generate possible solutions, with designers typically employing an array of visual methods to achieve this. Despite these overlaps, there is limited evidence that AI has been used as a tool in design research. The paper presents a MA Design (with a specialisation in Interior Design) research project as a case study to investigate the application of AI as a methodology in design research.

Case study

The MA Design research project investigated design strategies that address the consumer behaviour of millennials in South African furniture retail stores. The study was positioned in the social constructionism paradigm and used qualitative research interviewing methods aligned with AI as an affirmative form of inquiry. AI is well suited to the study as it investigated an under-researched topic of design practice. AI can be used successfully to extract information from interviewees that may not be known to them through its collaborative, positive approach. The researcher consulted an AI specialist to guide the inquiry process and assist with defining appropriate interview questions and methods of probing. Since organisational change was not the aim of the study, the specialist recommended focusing on the 'definition' and 'discovery' phases of the 4-D Model of AI.

Sample group

The study employed purposeful sampling to select participants. The literature review guided the criteria and defined conditions to ensure the participants from the sample group had in-depth and detailed information about furniture retail design strategies. The sample group comprises employees from retailers who are significant role players in the South African furniture retail industry and who target millennial consumers through an omnichannel retail model. Participants represented various employment ranks involved in defining and implementing design strategies, including the strategy director, head of marketing, marketing manager, brand manager, buyer, visual merchandiser and interior designer.

Data collection

Semi-structured interviews were conducted virtually and in person and lasted, on average, 40 minutes. The participants consented to the recording of interviews and the researcher noting their answers. Semi-structured interviews are typically used for AI as it is considered an effective method to collect sufficient data in a short timeframe (Watkins & Cooperrider 2000, p. 5). Semi-structured interviews offer flexibility because the questions can be adapted to probe with follow-up questions, which can uncover unexpected emerging themes and thus generate an understanding of future possibilities.

Participation was voluntary, and participants were not forced to share their identity or personal information if they did not wish. The researcher obtained consent from individual participants and their employers before the interviews. Individual consent was given through a signed consent form, which stated the purpose and background of the study, their expected contribution, and their right to withdraw from the study at any point. The researcher obtained consent from representatives of the respective employers through an institutional consent form that outlines how the employers' interests will be protected. The employers' representatives and the participants were informed that a copy of the study's results could be requested upon completion. Apart from the ethical considerations in this approach, creating a safe and collaborative environment where participants can speak freely, without

feeling the need to justify or defend experiences, aids in uncovering assumptions and exploring unstated perspectives.

The interviews followed the SOAR Model (Stavros, Cooperrider & Kelly 2003), meaning the interview technique aims to identify the topic's strengths, opportunities, aspirations, and results. The SOAR Model is a positive, future-focused approach that aligns with the five principles of AI mentioned earlier: constructionist, simultaneity, poetic, anticipatory, and positive. Interview questions were aligned to broad topics that emerged from the literature review, namely 'the millennial consumer'; 'the furniture industry, both locally and internationally'; and 'the interior environment of furniture retail stores'. The interview questions typically introduced the topic in a positive, future-focused manner, to open the conversation for further open-ended probing questions, e.g., "Tell me about some successful examples you know of where furniture retail stores are adapting to millennials".

Data analysis

The researcher transcribed the recorded interviews and examined them using reflexive thematic analysis (TA) as defined by Braun and Clarke (2021, p. 31). TA is often used in qualitative research and is appropriate for under-researched topics. Themes are generated from the data and not developed before the data collection. Reflexive TA recognises the researcher as an active participant in the process and acknowledges their subjectivity in interpreting the data. The researcher's perspective and potential biases are paramount, given that the method relies on an adaptive approach. This principle aligns well with the reflexive mindset inherent to AI. The researcher engaged in a recursive process where each step feeds into the next and utilised the six-phase structure for reflexive TA as presented by Braun and Clarke (2021, pp. 56-57).

The majority of responses aligned clearly with 'discovery', i.e., defining and appreciating 'the best of' the area of investigation. However, some responses were future-focused and therefore aligned to AI's 'dream' stage. The researcher noted in the study that "the participants were eager to share their future-focused ideas" even though this was not the aim of the study. The researcher developed a sub-code to identify and distinguish these responses. They were included under relevant themes and differentiated by prefacing findings with sentences such as: "When dreaming about the future"; and "Looking towards the future".

Implications of the study

The study indicates that using AI as a methodology, specifically as an interview protocol, can benefit both the researcher and the research project. Like most novice design researchers, the researcher had little to no experience with conducting rigorous research for dissemination. As expected, this resulted in a lack of confidence regarding research methodologies and the seemingly inflexible approach required for the development and implementation of interview protocols. Consultations with an AI specialist helped the researcher to realise that the reflective, explorative mindset adopted during the design process is akin to the outlook adopted by AI facilitators to ensure that an interview remains positive and probing. Once the researcher identified the overlap between the implicit designerly strength and the AI interview process, we (as supervisors) observed that the researcher approached the interviews with increased confidence. In a follow-up supervisory meeting, the student expressed her frustration with the "backwards-and-forwards" process of compiling the literature review. In contrast, she expressed "excitement to get started" with the interviews and described the data collection process as "enjoyable [because] I understand what to ask and how to keep the interview going". Devos (2005) describes the process of 'becoming' a researcher as a complex process that goes beyond acquiring new skills, knowledge and networks. Instead, she argues that this process requires

the taking up of a new identity and conducting oneself accordingly, or 'performing' the scholarly identity. Confidence in the research process, and the realisation that one can tap into professional experience, assists the novice researcher in developing a scholarly identity that is aligned with personal histories and choices.

The study aimed to identify and describe design strategies within a specific context. AI creates a collaborative interview environment where the sharing of ideas is encouraged, and where implicit processes can be uncovered through speculative discussions. Without aiming to do so, the interviews naturally progressed into the 'dream' stage. AI provided a platform for participants to envision a desirable future (dreaming), thereby offering the researcher insights that stretch beyond current practices to include potential development opportunities. AI can offer even more insights into design processes if the full 4-D cycle is employed to not only 'discover' and 'dream', but to also co-construct change ('design') and consider how such change can be sustained ('destiny') in design practice.

Conclusion

This paper provides valuable insights and recommendations for future applications of AI in design research. The selected case study used AI as a research methodology and as an interview protocol. In doing so, it demonstrates the value of this approach to gain a deeper understanding of design processes, especially when exploring under-researched fields. By using AI as the method of inquiry, unexpected data emerged, and new themes became apparent, highlighting the capacity of AI to uncover hidden insights and drive innovation in design research.

The paper argues that a strong alignment exists between AI and a designer's identity. It describes how designers exhibit a natural curiosity to interpret and make sense of current conditions and engage in creative problem solving to find a feasible solution. This predisposition to interpret and solve problems is further refined through their education and training, thereby making designers well suited to embrace the AI approach and leverage its potential in their research endeavours. Integrating novel methodologies that complement how we address complex design challenges into design research has significant implications for academia and professional practice. Academic research can contribute to the advancement of the design by eliminating the differences between ill-defined problems encountered in practice and theoretical interpretation in the academic domain. An iterative process of applying knowledge acquired through practice and integrating it into academia creates a cycle of continuous improvement that expands the theoretical base of the design that feeds back into practice.

The practical application of speculative approaches, such as AI, facilitates the evolution of design research, enabling it to be impactful in addressing real-world challenges. The paper encourages supervisors to motivate students to move beyond traditional research methods and embrace the opportunity to discover new perspectives, challenge existing paradigms, and push the boundaries of research in design.

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Flipping the script: Using artificial intelligence to design authentic assessment rubrics

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Abstract

Generative artificial intelligence (AI) is a key driver of innovation across all sectors and in education it has the power to optimise teaching and learning to benefit educators and students alike. However, the increasing prominence and influence of AI in domains previously exclusive to humans, such as design, raises urgent questions about the assessment of learning in design education. Recent writings in the field of design education agree that in the age of AI, educators need to revisit existing assessment practices. Conversations about AI and assessment practices appear to revolve around upholding academic integrity and defining what should be assessed when students can create design outcomes using generative AI. This study flips the script: Instead of focusing on managing the use of AI by students to create design outcomes, this study asks a further question. How can design educators use generative AI to facilitate the design of authentic assessment rubrics?

An outcomes-based approach is common in South African design education, and practical projects are used as assessment instruments. The focus of the assessments is on helping students apply their knowledge and skills practically in a real-world context. As a result, design assessments lean towards assessing the design process rather than relying solely on the design outcome, therefore, assessing students' ability to articulate the reasoning behind their application of knowledge and skills. Assessments used for practical projects typically use assessment rubrics that feature clear evaluation criteria, and aim to provide comprehensive feedback to students. Using authentic assessment, a student-centred approach to assessment practices, curriculum designers can effectively mimic the real working environment, align to the principles and dimensions of authentic assessment, promote deeper learning, and ensure that holistic learning experiences for students are taken into account. However, defining assessment criteria and descriptors that are authentic, clear, well-formulated, and not overly restrictive demands careful consideration to avoid gaps, making it a time-consuming process.

This paper explores the potential of using AI by using ChatGPT in the design of authentic assessment rubrics, and presents a critical reflection on insights gained from action research. The research was conducted by three curriculum designers working across various design qualifications at a private higher education provider. The study contributes to the emerging broader discussion on the innovative use of AI to support teaching and learning within the field of design education.

Keywords: Artificial intelligence, assessment rubrics, assessment practice, authentic assessment.

Introduction

Artificial intelligence (AI) has been used in education for a while. Tools such as Turnitin, for example, are widely used to encourage honesty and foster academic integrity (Chen, Chen & Lin 2020). Recent advances have given AI the ability to generate or create new content such as code, images, audio, and text (Zhihan 2023), causing concern among educators about how we assess learning – especially in domains like design that were previously considered exclusive to humans (Siemens 2022). Even before the latest developments in generative AI, Grainger and Weir (2020) criticised traditional assessment practices for lacking transparency and fairness, and failing to align assessment criteria with learning outcomes. They argue that these practices provide only a snapshot of what students can do at a specific point in time, rather than a nuanced view of their learning (Grainger & Weir 2020).

Design education in most South African institutions follows an outcomes-based approach, and practical projects are used as assessment instruments (Giloï & Du Toit 2013). Design assessments emphasise the practical application of knowledge and skills in a real-world setting (Giloï & Du Toit 2013). However, if design education aspires towards more than skills development and technical mastery, assessments should also focus on process, and encourage students to actively engage in critical thinking, conceptualisation, and contextualising their work within the broader design practice (Giloï & Du Toit 2013). As the focus of design education becomes more learner-centred and outcomes-based, we are grappling with the challenge of providing students with clear learning outcomes that foster creativity, deep learning and understanding, yet accommodate the unique nature of a creative field; it should support transparent, reliable assessment of the person, the creative process, and the final artefact (Giloï & Du Toit 2013; Siemens, McGraw & Kelly 2022). Likewise, current perspectives on the impact of AI in education suggest that assessments should emphasise the process of learning, and shift its focus from what, who and when, to how and why (Academy of Science South Africa 2023; Carvalho, Martinez-Maldonado, Tsai, Markauskaite & De Laat 2022; Hardman 2023; Swiecki, Khosravi, Chen, Martinez-Maldonado, Lodge, Milligan, Selwyn & Gašević 2022).

Assessment practices typically emphasise three dominant areas of focus: The learning outcomes or skills that must be assessed, tasks students engage in to demonstrate those skills, and the instruments used to relate the evidence from tasks to the achievement of the desired outcomes (Swiecki et al. 2022). Giloï and Du Toit (2013) propose authentic assessment, a student-centred assessment approach that promotes deeper learning and focuses on the holistic learning experience of the individual by providing opportunities to engage with real-world problems in contexts mimicking a real-world work environment, as an alternative to traditional assessment practices. However, to support student engagement in the learning experience, such assessments should be guided by clear criteria that accurately describe the standards for mastery of the subject matter (Grainger & Weir 2020). Moreover, assessments with well-defined assessment criteria and clear rubrics foster more reliable assessments and support assessors, regardless of their level of experience or tacit knowledge, to assess work consistently (Grainger & Weir 2020). Developing such assessment rubrics can be arduous and time-consuming and requires a deep understanding of the discipline by the person designing the assessment (Chen et al. 2020).

So far, research has focused predominantly on the meaningful integration of AI as a tool for students to use during assessment activities. Chen et al. (2020) argue that both students and lecturers can potentially benefit from the use of AI to support assessment design (Chen, Chen & Lin 2020), but more research is needed on how AI can be integrated in determining the learning outcomes to be assessed

and in defining assessment criteria that accurately describe the standards for mastery of the subject matter (Swiecki et al. 2022).

The aim of this study was to explore how generative AI can be used in the design of authentic assessment rubrics, and to identify potential benefits and challenges. In this paper, we begin by providing a theoretical overview of the characteristics and principles of authentic assessment, which we employed as a framework to guide and evaluate our development of assessment rubrics using ChatGPT. Subsequently, we discuss the process and methods we used. We conclude with a critical personal reflection on the lessons we learnt and the benefits and challenges we identified during our investigation. The study contributes to an ongoing and broadening discussion on the innovative use of AI to support teaching and learning in design education.

Authentic assessment practices

The concept of authentic assessment first emerged in literature in the 1980s, spurred by the need to adequately prepare students for the world of work. It gave rise to more realistic and student-centred assessment approaches (Archbald & Newmann 1988; Frey, Schmitt & Allen 2012). Villarroel, Bloxham, Bruna, Bruna and Herrera-Seda (2018) systematically reviewed 112 articles on authentic assessment and instruction spanning more than 30 years. They identified 13 central characteristics, which they refined into three conceptual dimensions of authentic assessment (Figure 1).

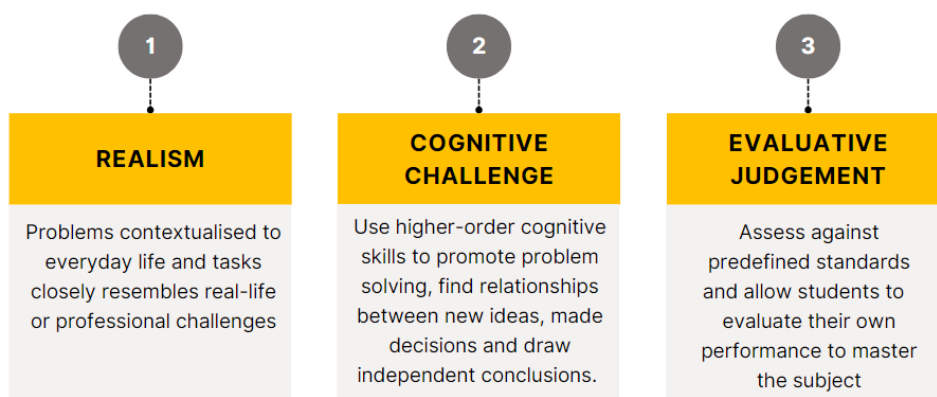


Figure 1: Three conceptual dimensions of authentic assessment (adapted from Villarroel et al. 2018)

The first dimension, Realism, refers to the incorporation of a real-world context in the assessment, where the task replicates challenges encountered in professional work settings (Villarroel et al. 2018). Realistic assessments are performance-based, requiring students to produce work that closely aligns with the demands of the respective profession, accurately representing or simulating the knowledge, understanding, and skills required in that field of employment (Villarroel et al. 2018).

The second dimension, Cognitive Challenge, relates to the cognitive complexity of learning objectives and tasks (Anderson & Krathwohl 2001) to ensure that an assessment is cognitively challenging and includes higher-order thinking skills (Villarroel et al. 2018). Instead of simply regurgitating information, cognitively complex assessments promote problem solving, decision making, the identification of relationships between new ideas, connection of theoretical concepts to real-life experiences, and the analysis of existing data to draw independent conclusions (Villarroel et al. 2018).

The third dimension, Evaluative Judgement, involves the practise of assessing against predefined standards such as those included in assessment rubrics (Villarroel et al. 2018). Setting clear and explicit assessment criteria at the start of an assessment promotes students' comprehension of the required standard, empowers them to reflectively evaluate their performance and quality of work, and supports them in mastering the subject (Villarroel et al. 2018). In this study, the dimensions of authentic assessment were used as the guiding theoretical framework to define the assessment tasks and criteria included in ChatGPT prompts.

The process used is based on the work of Jon Mueller, Professor of Psychology at North Central College in Naperville. Mueller (2005) developed the Authentic Assessment Toolbox, a tool to design authentic standards, tasks, and assessment rubrics that measure and improve student learning.

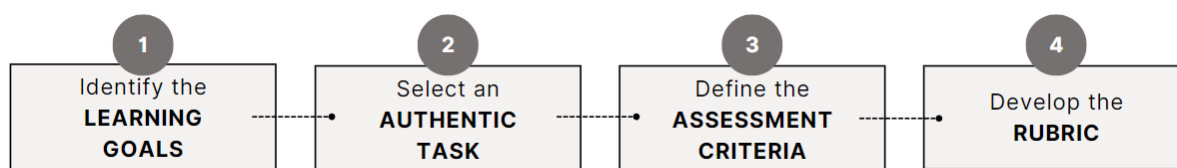


Figure 2: Mueller's (2018) Authentic Assessment Toolbox

The toolbox presents a four-step process to guide educators in designing authentic assessments (Figure 2). In the first step, the learning outcomes to be assessed are defined (Mueller 2005). These outcomes inform the assessment tasks and criteria. In the second step, an appropriate assessment task that allows students to authentically demonstrate the extent to which they have mastered the defined learning outcomes is selected. In the third step, criteria for assessing mastery of the specified learning outcomes are defined (Mueller 2005). The first three steps in the process lay the foundation for the final step, where an assessment rubric is developed (Mueller 2005). This toolbox supports curriculum designers in considering the alignment of learning outcomes, assessment tasks and criteria, and clearly articulating the expected outcomes and standards to students (Mueller 2005). Clear outcomes and standards support students' understanding of expectations and support them in achieving learning goals (Mueller 2005).

Methodology and process

This study was born from the curiosity of three curriculum designers responsible for three distinct design qualifications at a private higher education institution. We investigated the potential use of generative AI to support the development of quality, authentic assessment rubrics within tight institutional deadlines. The aim was to explore the use of ChatGPT, a generative AI tool, to support the development of authentic rubrics for design assessments. Action research was employed because the cycles of observation, reflection, planning, and action inherent to this mode of enquiry are uniquely suited to the purpose of improving the practice of curriculum design (Cresswell & Guetterman 2019). Moreover, action research aligns with the everyday practices of design (Cole, Puro, Rossi & Sein 2005), presenting a mode of enquiry that extends the everyday practices of curriculum designers into a vehicle for academic enquiry.

The launch of ChatGPT early in December 2022 caused concern as educators and institutions wondered if and how students should be taught to harness it as a tool, while maintaining academic integrity (Buckingham-Schum 2023). The notion of a tool capable of generating quality content faster and more efficiently, intrigued us. What if we flipped the script and instead of considering how

students could use it to complete assessment, we explored its usefulness in designing assessment rubrics?

Initially, we randomly prompted ChatGPT to generate assessment rubrics for various existing design projects. Although the ChatGPT rubrics left much to be desired, some descriptors hinted at learning outcomes, assessment criteria, or assessment tasks that could be added to enhance the authenticity of our assessments. Our observations suggested that ChatGPT could be used as a generative tool to support our design of meaningful assessment tasks and rubrics that provide clear guidelines of expected standards to both students and markers.

We decided that our initial observations warranted a deeper investigation by following a more rigorous approach. From a review of the literature on authentic assessment, we identified appropriate criteria for evaluating the authenticity of assessment rubrics and a process that we could draw on to reliably conduct our investigation. We combined the Authentic Assessment Toolbox (Mueller 2005) and the Dimensions of Authentic Assessment (Villarroel et al. 2018) to create an Authentic Assessment Planning worksheet (Appendix A) that could be used to evaluate the alignment between learning outcomes, assessment tasks, and criteria.

We applied purposive criterion sampling to select assessments with sufficient similarities and differences to compare and contrast the findings (Palinkas et al. 2015). We drew a sample of nine assessments to include one assessment per NQF Level across levels 5, 6 and 7, each from three distinct design disciplines. While each discipline has its unique theories, skills, and learning outcomes, they share common philosophical paradigms, design processes, and creative practices (Cross 2007; Dorst 2017). All assessments in the sample evaluate core design competencies such as research, abductive thinking, creativity, and iterative prototyping, as well as the application of discipline-specific knowledge and skills. As NQF levels increase, assessments are progressively more cognitively demanding, with stricter mastery criteria. Competencies assessed across the three qualifications and the three NQF levels allowed sufficient similarity for meaningful comparisons, while discipline-specific and level-specific knowledge and skills in each assessment provided sufficient differences for contrast. We regarded a small sample as adequate because the goal of the study was only to discover possible ways in which generative AI might support authentic assessment development and improve our practice as educators, not to derive heuristics or generalisable guidelines.

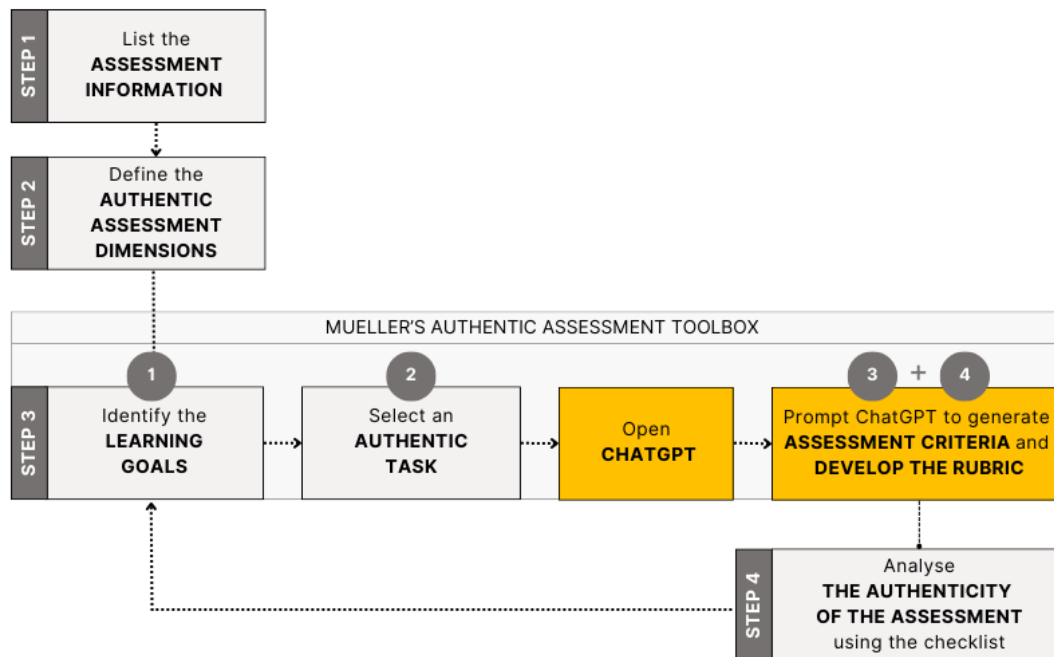


Figure 3: Process to plan, generate, and evaluate assessment rubrics with ChatGPT (authors' own)

Each researcher independently followed the process outlined in Figure 3 (above). In the Authentic Assessment Planning worksheet (Appendix A), we used learning outcomes and assessment tasks from our existing assessments as a departure point. We employed these defined learning outcomes and assessment tasks as prompts for ChatGPT to generate assessment criteria and rubric descriptors. We systematically evaluated the generated rubrics against the Authentic Assessment Checklist (Appendix B) and iteratively refined the learning outcomes and assessment tasks included in the ChatGPT prompts after each evaluation until the generated rubrics met the criteria in the Authentic Assessment Checklist.

Findings

Although the design qualifications we manage all share certain broad design competencies, each qualification also includes discrete, discipline-specific knowledge and skills. The ability to apply such knowledge and skills must also be assessed. In addition, the real-world problems and world-of-work contexts of the three design disciplines differ, resulting in different nuances in the assessment approaches of each curriculum designer. In order to facilitate comparison, each of us reported on our discrete findings in this study.

Design Qualification 1

To simulate real-world contexts, the scope of projects in this qualification is quite big, and assessments are in the form of practical Portfolios of Evidence with discrete parts building on one another. I used the assessment descriptions, learning outcomes and assessment tasks of existing NQF Level 5, 6 and 7 assessments for the purpose of this study. Following the process outlined in Figure 3, I included a description and the learning outcomes and assessment tasks in my initial ChatGPT prompt to generate a rubric (Figure 4). ChatGPT used the assessment tasks to generate criteria. An evaluation of the generated rubric revealed that the rubric only assesses whether tasks were completed or not, and

that the descriptors provide little or no guidelines about the expected standard of mastery of learning outcomes (Figure 5).

Create a five-column rubric to assess a concept for a basic board game where students had to demonstrate the ability to conduct research to inform and original idea for a game that will appeal to players, the ability to generate multiple original game ideas and select the best one and the ability to develop the idea into a unique board game concept through considered application of game play and core game mechanics.

Figure 4: The first prompt to generate a rubric included assessment description, learning outcomes, and assessment tasks

Criterion	Unsatisfactory (1)	Developing (2)	Proficient (3)	Advanced (4)	Exceptional (5)
Conduct, Analyze, and Interpret Research	The student did not conduct research or failed to analyze and interpret findings.	The student conducted some research but struggled to analyze and interpret findings effectively.	The student conducted research and provided basic analysis and interpretation.	The student conducted thorough research, and the analysis and interpretation were insightful.	The student conducted extensive research, offering deep insights through analysis and interpretation.
Affinity Diagram for Analysis of Findings	The student did not use an affinity diagram for analysis, or it was used incorrectly.	The student attempted to use an affinity diagram but did so with errors or limited effectiveness.	The student used an affinity diagram effectively, but the application was somewhat basic.	The student used an affinity diagram skillfully to analyze findings, demonstrating a strong understanding.	The student used an affinity diagram masterfully, resulting in a comprehensive and insightful analysis.
Creation of Player Persona	The student did not create a player persona or did so with significant inaccuracies.	The student created a player persona, but it lacked depth or relevance to the research findings.	The student created a relevant player persona with reasonable depth and insights.	The student created a well-crafted player persona that effectively demonstrated insights from research.	The student created an exceptionally detailed and insightful player persona, showcasing a deep understanding of research findings.

Figure 5: In the rubric generated with ChatGPT, assessment tasks were turned into assessment criteria, and descriptors are superficial

For the second attempt, I only included learning outcomes as defined in existing assessments but added a purpose at the end of each outcome (Figure 6). ChatGPT turned the information in the prompt into assessment criteria. The generated rubric descriptors assessed the completion of a task, but also considered to what extent the purpose had been met (Figure 7). The descriptors provided better guidelines for the standard of mastery (see Column 5), but were still superficial and open to interpretation, using words like creativity and diversity.

Create a five column rubric to assess the following learning outcomes: Conduct research to inform game ideas
 Generate multiple game ideas
 Evaluate ideas to select the best one
 Apply the principles of game design to develop a game idea into a game concept

Figure 6: Prompt based on learning outcomes and purpose

Criterion	Unsatisfactory (1)	Developing (2)	Proficient (3)	Advanced (4)	Exceptional (5)
Conduct Research to Inform Game Ideas	The student did not conduct research or failed to use it to inform game ideas.	The student conducted minimal research, but its application to game ideas was weak.	The student conducted research and applied it somewhat effectively to game ideas.	The student conducted thorough research and used it proficiently to inform game ideas.	The student conducted extensive research, resulting in a rich source of insights for game ideas.
Generate Multiple Game Ideas	The student struggled to generate multiple game ideas, producing only a few, or they lacked diversity and creativity.	The student generated some game ideas, but the quantity or creativity was limited.	The student generated a variety of game ideas, demonstrating creativity and diversity.	The student generated numerous creative game ideas, showcasing a high level of creativity and diversity.	The student produced a wealth of exceptionally creative game ideas, reflecting remarkable diversity and innovation.

Figure 7: In the ChatGPT-generated rubric, learning outcomes were turned into assessment criteria, descriptors do not consider assessment tasks, and lack clear guidelines

On critical reflection, I realised that the learning outcomes in the existing assessments were, in fact, assessment tasks and not learning outcomes at all. One task often assessed several learning outcomes. Consequently, I redefined the learning outcomes. I included the new learning outcomes and brief descriptions of associated assessment tasks in my next prompt (Figure 8). The generated rubric assessed each discrete learning outcome and included guidelines for the standards of mastery (Figure 9, Column 6). However, the descriptors in the columns to the left still lacked depth or accurate guidelines for improvement (Figure 9, Columns 2 and 3)

Please create a five column rubric to assess the following outcomes: Analyse board games to identify what makes them fun, Gather and analyse player information to identify their preferences, interpret the findings to gain insight and inform unique and fun game ideas , create a player persona to personify the target audience

Figure 8: A prompt including the assessment task and the discrete outcomes to be assessed

Criteria	Unsatisfactory (1)	Basic (2)	Proficient (3)	Advanced (4)	Exceptional (5)
Analyze Board Games for Uniqueness and Fun	Limited or no analysis of board games	Basic analysis with some depth	Thorough analysis with depth	Comprehensive analysis with exceptional depth and insight	Exceptional analysis with exceptional depth, insight, and innovation
Analyze Player Interviews for Preferences and Dislikes	Limited or no analysis of player interviews	Basic analysis with some depth of interview responses	Thorough analysis with depth and insight	Comprehensive analysis with exceptional depth and insight	Exceptional analysis with exceptional depth, insight and innovation
Interpret Findings on Game Uniqueness and Fun	Limited or no interpretation of findings	Basic interpretation with some depth	Thorough interpretation with depth and insight	Comprehensive interpretation with exceptional insight	Exceptional interpretation with innovative insight

Figure 9: In the ChatGPT-generated rubric, the learning outcomes were used as assessment criteria, and the descriptors included more detailed guidelines

I was curious about the ability of ChatGPT to identify assessment criteria, and in my next prompt, asked what it would consider good evidence of research in my project (Figure 10).



Figure 10: Prompt to ask ChatGPT what it would consider good evidence

ChatGPT returned 15 considerations. Several were too advanced for the level of the assessment (Figure 11), but Game Selection, Player feedback and motivations, Ethical considerations, and Actionable recommendations presented criteria that were covered in the learning content, appropriate for the assessment level, and could meaningfully assess learning. I prompted ChatGPT to generate rubric descriptors using these four considerations as assessment criteria. An evaluation of the generated rubric against the Authentic Assessment Checklist confirmed that this rubric included appropriate assessment criteria and clear, detailed descriptors to guide students and markers on the standards of mastery, and to provide meaningful feedback for learning (Figure 12).

4. **Game Selection:** Include a variety of board games in your research, covering different genres, complexity levels, and player counts. This allows for a more holistic understanding of player likes and dislikes across various game types.
5. **Player Feedback:** Consider both explicit feedback (what players say they like or dislike) and implicit feedback (observed behaviors, emotional reactions) to paint a complete picture.
6. **Player Motivations:** Explore why players enjoy certain aspects of board games. Understand their motivations, whether it's for social interaction, competition, strategy, storytelling, or other factors.
7. **Contextual Factors:** Recognize that player likes and dislikes can be influenced by contextual factors such as the gaming group, setting, and duration of play. Consider these variables in your research.
8. **Comparative Analysis:** Compare and contrast player preferences and dislikes across different board games. Identify patterns and common themes that emerge.
9. **Player Segmentation:** Analyze data to segment players into groups with similar preferences. This can help in tailoring game design to specific target audiences.
10. **Longitudinal Studies:** Consider conducting longitudinal studies to track changes in player preferences over time. This can be valuable for understanding trends in the gaming community.
1. **Ethical Considerations:** Ensure that your research adheres to ethical guidelines. Obtain informed consent from participants and protect their privacy.
2. **Expert Opinions:** Supplement player feedback with insights from board game experts, designers, and reviewers. Expert opinions can provide additional context and validation.
3. **Feedback Channels:** Explore various feedback channels, including online forums, social media, and game review platforms, to gather player opinions and sentiments.
4. **Data Analysis Tools:** Utilize appropriate data analysis tools and techniques to identify patterns, correlations, and trends in player likes and dislikes.
5. **Actionable Recommendations:** Conclude your research with actionable recommendations for game designers, developers, and publishers. Provide insights on how to enhance

Figure 11: Criteria for evidence of good player research generated in ChatGPT

Criterion	Unsatisfactory (1)	Developing (2)	Proficient (3)	Advanced (4)	Exceptional (5)
Game Selection (variety and relevance of board games included in the research)	Limited game selection with no diversity in genres, complexity, or player counts. Games chosen lack relevance to the research objectives.	A basic selection of board games, covering only a few genres or player counts. Some games may not align well with research objectives.	Offers a diverse selection of board games, including various genres, complexity levels, and player counts. Games chosen are relevant to the research objectives.	An extensive and well-balanced selection of board games that represents a wide range of genres, complexity levels, and player counts. Games chosen are highly relevant to the research objectives.	Exceptional game selection that showcases a comprehensive array of board games from various genres, complexity levels, and player counts. Games chosen are exceptionally relevant to the research objectives.
Depth and relevance of player feedback and motivations	Limited player feedback gathered. Fails to explore player motivations or delve into the "why" behind preferences.	Collects player feedback, but it lacks depth or is predominantly quantitative.- Provides minimal insights into player motivations.- Some feedback may be tangential to the research objectives.	Collects player feedback, but it lacks depth. Provides minimal insights into player motivations.	Gathers comprehensive player feedback. Identifies and explores player motivations related to likes and dislikes. Feedback is largely relevant.	Collects rich player feedback from diverse sources. Offers deep insights into player motivations, delving into the underlying reasons behind preferences. Feedback is highly relevant.
Ethical considerations in the research	Fails to address ethical considerations in the research.- Does not obtain informed consent from participants or protect their privacy.	Addresses some basic ethical considerations, such as informed consent, but with shortcomings. Privacy protection measures may be insufficient or inconsistent.	Adequately addresses ethical considerations, including informed consent and privacy protection.	Demonstrates a strong commitment to ethical principles in research. Obtains informed consent and protects participant privacy effectively.	Exhibits an exceptional commitment to ethical standards, with meticulous attention to detail. Exceeds expectations in obtaining informed consent and safeguarding participant privacy.

Figure 12: The rubric generated in ChatGPT based on generated assessment criteria

With the remaining two assessments, I refined my process. Before prompting ChatGPT to generate a rubric based on learning outcomes in existing assessments, I prompted it to generate assessment criteria and then checked the alignment of those criteria against existing learning outcomes. I then selected those criteria appropriate to the assessment level and aligned with the outcomes and used them in my ChatGPT prompts to generate assessment rubrics. I evaluated the generated rubrics against the Authentic Assessment Checklist. The generated rubrics required only minor adjustments, such as the simplification of the language used in the descriptors. Using the refined process, I was able to generate a quality, authentic rubric in an hour, compared to the two to three hours that I required without ChatGPT.

Design Qualification 2

I started by providing ChatGPT with detailed prompts, including the learning outcomes, the module purpose, the tasks, and so on. The generated rubric was very superficial. Consequently, for the second attempt, I used short instructions in the prompts (Figure 13). The rubrics generated in ChatGPT

provided more detailed guidelines (Figure 14). Additional conversational prompts (Figure 15) generated more detailed assessment criteria and descriptors (Figure 16).

Design a 5-column marking rubric to assess the following learning outcomes:

- Analyse an existing Healthy Space and what principles you can apply in your design;
- Design and develop an original space that intends to facilitate healing and mitigate stress and is inclusive and accessible to all
- Use advanced industry appropriate technology to effectively convey a design to the client.
- Apply relevant building regulations pertaining to the built environment relative to interior design solutions with the use of working drawings and specifications
- Design an overall creative and visually appealing client presentation to industry standards

Figure 13: A simplified prompt used to generate an assessment rubric on ChatGPT

Criteria	Excellent (5)	Proficient (4)	Satisfactory (3)	Needs Improvement (2)	Poor (1)
Outcome 1: Analyze Healthy Space					
Demonstrates deep understanding of principles in existing healthy spaces and effectively applies them in design.	Exceptional insight and application.	Proficient understanding and application.	Adequate understanding and application.	Limited understanding and application.	Minimal understanding and application.

Figure 14: The results of using a simplified prompt to generate descriptors in ChatGPT

Provide more details under level 1-4 not just 5

Figure 15: Additional prompt to refine rubric created using ChatGPT

Criteria	Level 5 (Excellent)	Level 4 (Proficient)	Level 3 (Satisfactory)	Level 2 (Needs Improvement)	Level 1
Outcome 1: Analyze Healthy Space	Exceptional insight and application. Student demonstrates a deep understanding of principles in existing healthy spaces and effectively applies them in the design.	Proficient understanding and application. Student has a strong understanding of principles in existing healthy spaces and successfully applies them in the design.	Adequate understanding and application. Student demonstrates an understanding of principles in existing healthy spaces and applies some of them in the design.	Limited understanding and application. Student has a basic understanding of principles in existing healthy spaces but struggles to apply them effectively in the design.	Minimal understanding and application. Student has a very basic understanding of principles in existing healthy spaces and fails to apply them in the design.
Outcome 2: Design Healing	Innovative and comprehensive design that	A well-thought-out design with	A design with some elements, but not fully	A design with limited consideration	Poorly

Figure 16: The rubric generated in ChatGPT after refining the assessment criteria

I wanted to investigate what other assessment considerations ChatGPT might include in the rubric. Instead of using all five learning outcomes in the first prompt, I experimented by only including one learning outcome (Figure 17) per prompt. ChatGPT generated five subcategories to be assessed. The first rubric (Figure 16) generated in ChatGPT assessed insight and application, but the second rubric (Figure 18) deconstructed the requirements to evaluate insight and application. The generated rubric considered understanding, identification of principles, integration into the design, clarity of communication, and critical thinking. Combining these assessment criteria resulted in clear descriptions of what is required to demonstrate mastery of the learning outcome (Figure 19).


Design a 5-column marking rubric to assess the following learning outcome: Analyse an existing Healthy Space and what principles you can apply in your design 

Figure 17: Simplified prompt using only one learning outcome

Criteria	Excellent (5)	Very Good (4)	Good (3)	Fair (2)	Number of Responses (1)
Understanding of Healthy Space	Exceptional understanding of what constitutes a Healthy Space, demonstrated through detailed analysis and clear articulation of key elements and their impact.	Strong understanding of Healthy Space, with clear analysis of its key elements and their relevance.	Adequate understanding of Healthy Space, with some analysis of key elements.	Limited understanding of Healthy Space, with minimal analysis of key elements.	Percentage of responses
Identification of Principles	Thorough identification and articulation of multiple design principles that can be applied, with a clear rationale for each.	Identification of several design principles that can be applied, with a rationale for most.	Identification of some design principles that can be applied, but rationale may lack depth or clarity.	Limited identification of design principles, with weak or unclear rationale.	Mean score
Integration into Design	Demonstrates a comprehensive and creative integration of Healthy Space principles into the design proposal, showcasing an	Effectively integrates Healthy Space principles into the design proposal, showcasing an	Partially integrates Healthy Space principles into the design proposal, but the connection	Limited integration of Healthy Space principles, with a tenuous link to the design	Deviation from expected performance

Figure 18: The rubric generated in ChatGPT when using one learning outcome in the prompt

Combine the text and shorten: Exceptional understanding of what constitutes a Healthy Space, demonstrated through detailed analysis and clear articulation of key elements and their impact. Thorough identification and articulation of multiple design principles that can be applied, with a clear rationale for each. Demonstrates a comprehensive and creative integration of Healthy Space principles into the design proposal, showing a deep understanding of their applicability. Communication is exceptionally clear, well-organized, and free of errors, enhancing the reader's understanding of the analysis and design principles. Demonstrates exceptional critical thinking skills by providing insightful and original perspectives on Healthy Space analysis and design principles.

Exceptional comprehension of Healthy Space, evident in detailed analysis and clear articulation of key elements and their impact, along with a thorough identification and rationale for multiple design principles. Demonstrates a comprehensive and creative integration of Healthy Space principles into the design proposal, enhancing reader understanding. Exceptional critical thinking is evident through insightful and original perspectives on Healthy Space analysis and design principles.

Regenerate

Figure 19: The final assessment criteria in the Excellent column of the rubric generated in ChatGPT

Upon critical reflection, I realised that the previous rubrics that I created provided superficial guidelines and focused heavily on deliverables. These rubrics considered the possibility for students to include elements beyond the basic requirements of the brief but lacked guidelines for students to achieve mastery. Using ChatGPT to generate the assessment rubric supported me in unpacking the assessment criteria and in providing detailed guidelines on what is required to master a learning outcome and reliable means to evaluate their own performance.

The Authentic Assessment Planning Worksheet supported my ability to define clear learning outcomes and align these with authentic tasks. Using ChatGPT enabled me to design rubrics in less time than doing so completely by myself, but I still needed to draw on my detailed subject matter knowledge to refine the generated rubrics into authentic assessment tools.

Design Qualification 3

My initial attempts to generate assessment rubrics with ChatGPT using the process described in Figure 3 resulted in superficial rubrics. Only when I refined my prompts did ChatGPT generate detailed rubric descriptors. I explored using prompts with learning outcomes and associated assessment tasks listed in brackets behind each outcome (Figure 20). This approach generated detailed descriptors that provide guidelines for the standards required as evidence of mastery (Figure 21).

Design a five-column marking rubric to assess the following outcomes: 1. Textual and Visual research (on your chosen brand, visual identities, competitors, and visual research to be placed on a mood board). 2. Strategic direction (problem statement, target audience, findings, insights and message) 3. Concept development and Ideation (various ideation techniques, sketches, and prototypes to develop an original concept and creative solution) 4. Final executions (fundamentals and principles of design and visual communication). 5. Creative rationale (the why and how of the design decisions made) 6. Personal reflection.

Figure 20: Learning outcomes used as prompts with assessment tasks included in brackets

Criteria	Novice	Developing	Proficient	Accomplished	Exemplary
Textual and Visual Research	Research was conducted on the chosen brand, visual identities, competitors, and mood board.	Basic research was conducted but lacked depth and variety of sources. The mood board is incomplete or lacks cohesion.	Sufficient research was conducted on the chosen brand, visual identities, competitors, and mood board, incorporating a range of relevant sources. The mood board demonstrates a clear understanding of the visual landscape.	Comprehensive research was conducted on the chosen brand, visual identities, competitors, and mood board, demonstrating a thorough understanding of the subject matter. The mood board is well-curated, visually appealing, and effectively communicates the desired aesthetics.	Extensive and insightful research was conducted on the chosen brand, visual identities, competitors, and mood board, showcasing a deep understanding of the subject matter. The mood board is exceptionally well-crafted, visually compelling, and thoughtfully conveys the desired visual direction.
Strategic Direction	Problem statement, target audience, findings, insights, and message are missing or unclear.	Problem statement, target audience, findings, insights, and message lack clarity and coherence.	Problem statement, target audience, findings, insights, and message demonstrate a clear understanding of the project's objectives and provide a basic strategic direction.	Problem statement, target audience, findings, insights, and message are well-defined, cohesive, and support the overall creative strategy.	Problem statement, target audience, findings, insights, and message are highly articulated, showcasing a deep understanding of the project's objectives and providing a compelling and innovative strategic direction.
Concept Development and Ideation	Limited or inappropriate ideation techniques employed. Sketches and prototypes lack creativity and originality.	Some appropriate ideation techniques are employed but lack depth and variety. Sketches and prototypes show limited exploration of concepts.	Appropriate ideation techniques are employed, generating creative and original concepts. Sketches and prototypes demonstrate a solid exploration of ideas and present viable design solutions.	Well-chosen ideation techniques employed, producing innovative and imaginative concepts. Sketches and prototypes showcase a thorough exploration of ideas and demonstrate refined design solutions.	Highly effective and diverse ideation techniques were employed, resulting in exceptionally creative, innovative, and original concepts. Sketches and prototypes exhibit a comprehensive exploration of ideas, displaying refined design solutions and a strong sense of visual communication.
Final Executions	Final executions lack understanding and application of design fundamentals and principles of visual communication. The visual identity solutions do not effectively solve the design problem.	Final executions show some understanding and application of design fundamentals and principles, but overall execution is weak or inconsistent. The visual identity solutions partially address the design problem.	Final executions demonstrate a good understanding and application of design fundamentals and principles of visual communication. The visual identity solutions effectively solve the design problem.	Final executions showcase excellent understanding and application of design fundamentals and principles, displaying strong visual communication and attention to detail. The visual identity solutions seamlessly and cohesively solve the design problem.	Final executions exhibit exceptional understanding and application of design fundamentals and principles, displaying a mastery of visual communication. The visual identity solutions are executed flawlessly and work exceptionally well to solve the design problem with a high

					level of creativity and innovation.
Creative Rationale	The rationale is missing or lacks coherence and clarity. The explanation of design decisions is absent or insufficient.	Rationale provides a basic explanation of design decisions but lacks depth and insight. The connection between design decisions and the overall creative strategy is unclear.	Rationale effectively explains design decisions, demonstrating a clear understanding of how they support the overall design solution. The connection between design decisions and the overall creative strategy is evident.	Rationale demonstrates a strong connection between design decisions and the overall creative strategy, offering insightful analysis and explanation. The rationale effectively communicates the motivations behind design choices.	Rationale is exceptional, showcasing a highly articulate and persuasive discourse on design decisions, supported by critical analysis, and demonstrating a deep understanding of the project's objectives and outcomes. The rationale eloquently communicates the significance and impact of design choices.
Personal Reflection	Limited or no personal reflection provided.	Some personal reflection is provided but lacks depth and critical insights.	Personal reflection demonstrates a thoughtful and considered assessment of the project, highlighting personal growth, challenges overcome, and lessons learned.	Personal reflection provides a comprehensive evaluation of the project, offering insightful analysis of personal strengths, weaknesses, and areas for improvement. Reflection showcases self-awareness and critical thinking skills.	Personal reflection is highly perceptive and demonstrates a profound understanding of personal growth, challenges, and growth opportunities. Thoughtful insights are provided, and future recommendations are outlined based on the reflection conducted.

Figure 21: More detailed rubric descriptors generated in ChatGPT

Upon critical reflection, I realised that my existing rubrics included high cognitive thinking skills, as well as exposing students to a variety of assessment tasks. They assessed problem solving, knowledge application, and decision making, while also evaluating the effectiveness with which students performed various tasks. However, the descriptors were somewhat superficial and did not provide clear guidelines to help students grasp what is expected and the standard for mastering each task. Similarly to the findings of Game Design, I observed that the descriptors generated in ChatGPT showed the scaffolding between different assessment tasks. This is an essential component of graphic design assessments since each task has an impact on the next, and a thread\link from one task to the next is required for students to perform well in their practical projects.

Lessons learnt

Although we all achieved slightly different results in the various iterations of our rubrics, the lessons we learnt from reflection were very similar. After our first attempts, we realised the importance of critically considering and making sure that learning outcomes are accurately defined and aligned with assessment tasks. Poorly defined learning outcomes resulted in poor assessment criteria that focus primarily on task completion and superficial descriptors that provide little guidance to students. Moreover, the lack of standards in such descriptors left them open to interpretation, providing limited

guidance for marking. The Authentic Assessment Checklist provided a good framework for evaluating assessment criteria and rubric descriptors; it sometimes forced us to critically reconsider our defined learning outcomes.

ChatGPT proved useful for identifying assessment criteria and generating clear and detailed descriptors that provide students and markers with guidelines in terms of standards for mastery. Prompting ChatGPT to generate assessment criteria also helped us identify potential learning goals we had previously overlooked, sometimes obliging us to revisit them, and reconsider learning content in our curricula. However, we still had to apply personal knowledge and experience as curriculum designers and educators to critically select criteria appropriate to the level of assessment aligned with the defined learning goals of those generated by ChatGPT. We also had to critically review the generated descriptors and adjust them to enhance clarity, and ensure that the level of language used is appropriate for our students. We found that quality, authentic rubrics cannot be generated by ChatGPT alone, but are co-created in an iterative, collaborative effort between the curriculum designer and generative AI. Although the use of ChatGPT significantly reduced the time required, the knowledge, critical analysis, and experience of the curriculum designer were crucial for prompting and for evaluating and refining generated content.

Conclusions

This study explored the potential role of generative AI in the design of authentic assessment rubrics. Findings from the study suggest that authentic assessment rubrics cannot be generated, but are co-created, and require a critical dialogue between the curriculum designer and the AI.

Using generative AI for rubric creation has distinct benefits, such as speeding up the process of writing clear, detailed descriptors once learning goals have been defined and appropriate assessment criteria identified. Speedier writing at the tail end of the process potentially affords curriculum designers more time during the initial stages to critically consider and refine learning goals, assessment tasks, and criteria.

More rigorous research with larger samples is required to identify stronger themes and general rules of thumb. However, the findings of this study suggest that there is room for reflection on traditional assessment practices and for the innovative use of AI to support curriculum and assessment design.

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APPENDIX A: AUTHENTIC ASSESSMENT PLANNING WORKSHEET

Based on the authentic assessment toolbox by Jon Mueller and the components of authentic assessment identified by Villarroel et al (2018)

STEP 1: LIST THE ASSESSMENT INFORMATION

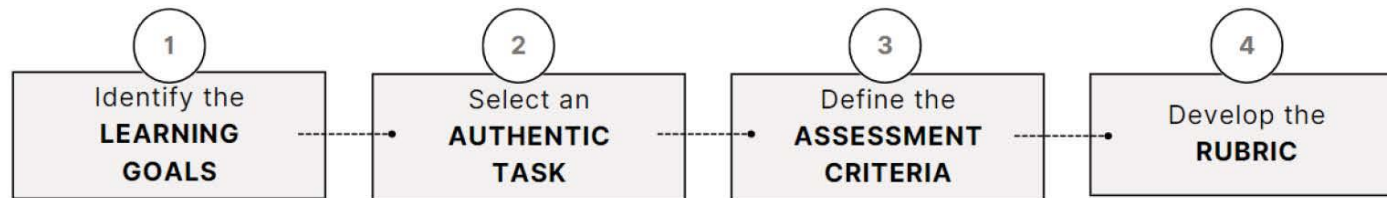
Module Name	
Audience	
NQF level	
Project title	
Assessment Description	
Module Purpose	
Module Outcome	

STEP 2: DEFINE THE AUTHENTIC ASSESSMENT DIMENSIONS

(you will need these to ensure your outcomes are pitched correctly and tasks are authentic for the next step)

Realism: Describe the real context and/or how the task addresses a real-world problem similar to those faced in real life	
Cognitive Challenge List the higher order cognitive skills to be assessed You can use Bloom's Revised Taxonomy for this	
Evaluative Judgement	Table below to include criteria and standards about what a good performance means and include feedback on how students may improve (feedforward feedback)

STEP 3: AUTHENTIC ASSESSMENT PLANNING TABLE:



Note: You will fill in the learning outcomes and tasks (1 and 2) , ChatGPT to generate the criteria and rubric (3 and 4)

	1. Identify the learning outcomes	2. Select an authentic task to address the learning goal	3. Define the criteria	4. Rubric
<i>TIPS</i>	<i>Identify what you want students to know/able to do in this assessment This needs to align with the module outcomes and purposes (assessment goals) Ensure that the verb used aligns to the task selected Use higher order skills (create, evaluate, analyse, apply)</i>	<i>Define the task and how it relates to the real world Align the task to the learning outcomes Ensure the task is complex in nature Include a variety of tasks</i>	<i>What does good performance on this task look like? What will students need to do in order to master the task?</i>	<i>The combination of the criteria and the levels of performance for each criterion will be your rubric for that task</i>
1				
2				
3				
4				
5				
6				
7				



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Design lecturers' pedagogical approach to practical studio sessions during the rapid transition to online learning

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Abstract

Design education revolves around the effectiveness of face-to-face interactions in the design studio for design pedagogy to be effective (Hammershaimb 2018). During the COVID-19 pandemic restrictions in South Africa in 2020, design-specialised lecturers had to rapidly transition their practical-orientated contact classes to online classes. Design education lecturers had to come to terms with students distanced from themselves, the institutional studio, and their peers. Lecturers had to rethink their pedagogical choices while preserving their programmes' academic integrity. This qualitative study focused on design lecturers' approach to facilitating the sudden change from contact-orientated classes to online classes for first-year Bachelor of Design students whose exposure to design education was little to none. This descriptive case study adopted an interpretivist stance and used the Cognitive Apprenticeship Model (CAM) as a theoretical framework to guide the analysis of data derived from five education design lecturers' semi-structured interviews and a focus group interview. This study does not establish the effectiveness or success of these design lecturers' pedagogical approaches; however, it clearly describes how design lecturers were able to conduct their studio classes in the online environment with a combination of various CAM methods.

Findings indicate that lecturers were familiar with and applied modelling, coaching, scaffolding, and exploration in their studio pedagogy. However, they were not clear on the distinction between reflection and articulation, and as a result, these methods were underutilised. These findings add to the debate on whether design education is over-reliant on physical studio-related pedagogies and whether pedagogies suited for the online environment can be equally effective. Therefore, future studies could further investigate the effectiveness of these design lecturers' pedagogical approaches, their use of Information and Communication Technologies to mediate practical design sessions, and what these practices mean for future design educational practices in South Africa.

Keywords: COVID-19, Cognitive Apprenticeship Model, design studio pedagogy, education design, online pedagogy.

Introduction

The core of Design Education centres around the effectiveness of face-to-face interactions within the design studio (Hammershaimb 2018). However, what happens when it is not possible to have in-person studio interactions, and design needs to be taught online? How do lecturers accommodate and

support design students to achieve learning outcomes in this sudden shift to an unfamiliar online environment? During the COVID-19 pandemic restrictions in 2020, specialised design lecturers had to rapidly transition their practical face-to-face contact classes to an online mode of delivery. In this rapid shift to online learning, design lecturers experienced what Toom (2006) refers to as pedagogical moments. They had to make decisions that upheld their vision of an effective learning experience and in their reconceptualisation of these practical studio sessions, considering that students were physically distant from one another, the studio, and the lecturer.

The aim of this study was to describe design lecturers' pedagogical decision-making in an unfamiliar online environment and further describe these approaches through the lens of the Cognitive Apprenticeship Model (CAM) and the existing theory on design education.

Educational practices in design education

Design Education is rooted in the practice-based approach to teaching and learning and typically involves applying creative problem solving within the physical environment of the design studio (Shao et al. 2009; Hammershaimb 2018). A practice-based curriculum requires students to actively acquire applied knowledge while continuously reflecting on the outcomes of their experiential learning (Daalhuizen & Schoormans 2018; Dorst & Reymen 2004).

Donald Schön (1987) introduced the cognitive design theory, emphasising that essential design concepts can only be understood in the context of practical engagement (Logan 2008; Visser 2011). Schön's theories on design pedagogy have greatly influenced effective teaching methods in design. His concepts of reflection-in-action and knowing-in-action form the foundation of the design process, where students question and challenge problems in real-life situations, engaging in a "*reflective dialogue with the designer's own knowing-in-action*" (Broadfoot & Bennett 2003, p. 3). As students *do* design, they engage in thinking, and this interplay between action and reflection enhances their learning process (Visser 2011). Through this process, students develop self-reflective and critical thinking skills, reframing problems and solutions (Khan & Botes 2017).

To foster critical thinking, Kvan (2001) suggested a shift in design education from a focus solely on the final product to a focus on the design process. This shift encouraged students to deliberate on their learning experiences whilst reviewing and evaluating their progress (Shao et al. 2009). Deliberation occurs when students step back from their design work to reflect on their experiences, methods, and outcomes to discover new possibilities for action that may not have been apparent (Broadfoot & Bennett 2003). Moreover, students engage in deliberation when their solutions to design problems are critiqued by lecturers, peers, and themselves, fostering a constant questioning of methods and seeking improved solutions. Ongoing discussions and feedback are crucial for students to reflect on multiple potential outcomes and solutions (Hammershaimb 2018; Logan 2008; Sharma et al. 2020).

The literature on design education highlights four criteria for effective design studio pedagogy (Kvan 2001; Moss & Edmonds 2008; Shao et al. 2009):

1. The central concept should be "learning-by-doing", as the core principles of design can only be truly understood within the context of practical engagement.
2. Tacit knowledge should be actively experienced through dialogue between students and lecturers. This dialogue occurs as students engage in the design process, involving articulation, reflection, and critique, whether in face-to-face or online interactions.
3. Design pedagogy should foster a collaborative environment, allowing students to build trust, rely on one another, and develop teamwork skills.

- The focus should be on the design process rather than solely on the final outcome, emphasising deliberation and reflection as integral parts of the design journey.

The acquisition of design skills has traditionally been associated with apprenticeship learning methods, where experts guide and transfer practical skill sets to novices (Kocadere & Ozgen 2012). In this approach, learning progresses from observing experts to receiving coaching and eventually applying knowledge and skills independently (Oriol et al. 2010).

One prominent framework that aligns with design education is the Cognitive Apprenticeship Model (CAM). While incorporating some elements of traditional apprenticeship, the CAM primarily focuses on developing students' cognitive and metacognitive knowledge rather than solely emphasising physical skills (Collins & Kapur 2014; Oriol et al. 2010). In the context of design education, the CAM aligns with pedagogy that promotes effective learning through experiences guided by a master practitioner (Adams et al. 2016). Cognitive apprenticeship is rooted in theories of situated cognition, which view knowing and doing as inseparable (García-Cabrero et al. 2018), connecting back to Schön's theory of reflective practice within the design studio. According to Schön (1987), design knowledge is acquired by observing and practising design while articulating and reflecting on the experience. Schön emphasises that tacit knowledge must be made explicit to share design knowledge (Logan 2008), which aligns with Cognitive Apprenticeship Model's methods. There are six methods that constitute the core of the Cognitive Apprenticeship Model in design education. These methods are depicted in Figure 1.

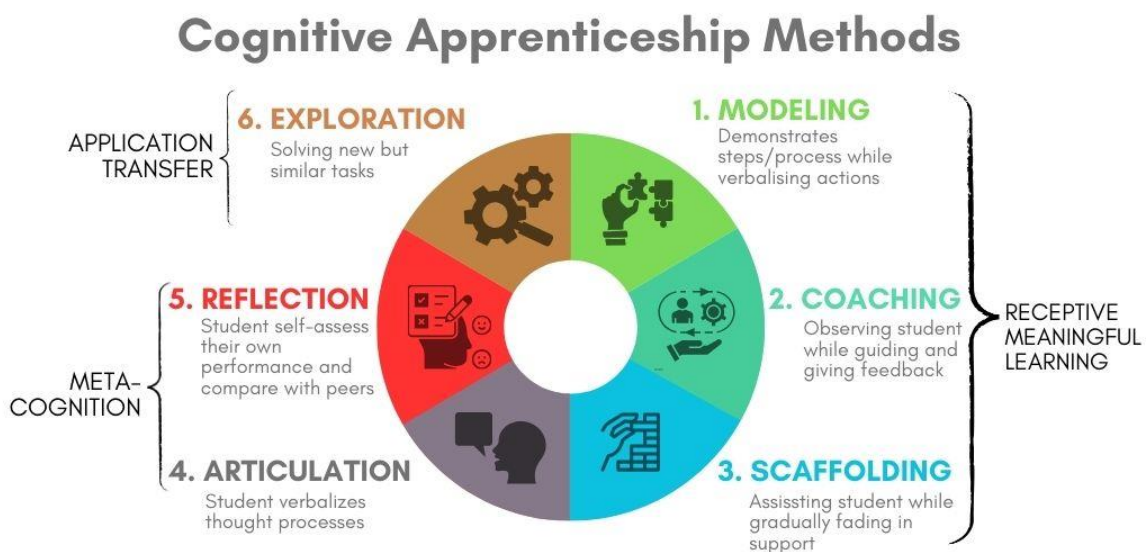


Figure 1: Cognitive Apprenticeship Model's six methods adapted from Seel et al. (2000)

Design lecturers naturally draw upon CAM methods, as they themselves were taught in a master-to-apprentice manner and understand the process of learning to design (Adams et al. 2016). Daly et al. (2019) and Walker (2019) describe how lecturers employ CAM techniques and explain that design lecturers inherently tacitly apply these. Even if they are unaware of the formal framework, design lecturers implement these methods by making their design knowledge visible, continuously demonstrating their design thinking to students, sharing their accumulated experience, knowledge, and belief systems, and guiding students to understand design.

Research method

This study was conducted at a private higher education institute (PHEI) specialising in design-orientated programmes. This PHEI has five campuses across South Africa. The data were primarily collected at the Pretoria campus. Each student is equipped with a laptop with all software needed, on-campus WiFi and access to the learner management system (LMS), where all their courseware is digitally available. The campus has a range of studios that are equipped with devices (desktop), projectors, and WiFi. Specific tools and specialised equipment are also available for the lecturer and students to use in these studios.

The lecturers are all from the industry and practising designers in their fields. They receive training in teaching and learning methods focused on blended learning throughout the year; however, the mode of instruction before the COVID-19 pandemic was primarily in contact-based studio settings where studio pedagogy is the primary teaching and learning methodology in design education and their experience and training in online teaching and learning were very limited to none at all. Five lecturers were selected via purposive sampling. The inclusion criteria focused on design lecturers who previously taught practical design sessions using face-to-face studio pedagogy and were teaching first-year students in a design degree programme.

The lecturers were interviewed after a year of teaching in the online environment and could describe their pedagogical approaches and experience in the online environment in depth by referencing concrete examples. The individual meetings were recorded in Microsoft Teams, and the researcher followed a semi-structured interview schedule based on the CAM's teaching methods. Each method was briefly explained, and then the researcher asked if the lecturer found themselves implementing this method and, if so, to elaborate on when, how, and their experience of it in the online environment. The individual interviews lasted between 45 minutes and 60 min, and the focus group interview for 90 minutes. Interview transcripts were captured and uploaded to ATLAS.ti 22.

The six methods of CAM as a deductive analysis frame were used to analyse and code the transcripts. Codes were clustered into these six themes related to the six methods. Table 1 lists the themes and associated codes (sub-themes) and their resulting groundedness referring to the number of quotes assigned to each code, i.e., the number of times the code was assigned to the data.

Table 1: Emerging themes, their codes and resulting groundedness used in this study

Themes	Codes	Groundedness
Application of Modelling	Lecturer modelling/demonstrating	26
	Online video content	14
	Challenges of online modelling	9
	Online guest speaker	5
	Students demonstrating to peers	7
	Showcasing examples and discussion	3
Application of Coaching	Peer Feedback/Sharing	22
	Formative feedback from Lecturer	18
	Coaching by guiding and hinting	12
	Coaching through further explaining/modelling	11
	Challenges Experienced with Online Coaching	10
	Scaffolding: Fading	18

Application of Scaffolding	Methods to track learner skill level	15
	Scaffolding: Adding support	11
Occurrence of Articulation	Articulating through discussion	13
	Lecture encouraging Articulation	11
	Articulating through documentation/written	9
	Articulating through demonstration	7
	Articulating through presentation	5
Occurrence of Reflection	Lecturer encouraging Reflection	9
	Reflection method – Journaling	6
	Absence of reflection	2
	Reflection method – class discussion	2
	Reflection happening spontaneously	2
Implementation of Exploration	Exploration encouraged	11
	Experience of Exploration Method	9

It is clear that the first three CAM methods – application of modelling, coaching, and scaffolding featured predominantly in the online mode of delivery. Articulation, reflection, and implementing exploration were mentioned as less often used methods in this mode.

Research ethics

The University of Johannesburg’s Department of Education adheres to the required ethical clearance protocols and standards, which are successfully implemented in this study. The lecturers participating in this research must be informed of the ethical considerations to give informed consent.

The consent letter, which invites participants, informs them of the following: details about the researcher, background of the research study, the purpose, and objectives of the research, and research process. A research disclosure section follows where the nominees are further informed of the terms of commitment to complete the informed consent section. This commitment includes information on the expected outcomes, expected duration per evaluation point, as well as risks and benefits of participation. The nominees must consent to avail themselves as participants in a semi-structured interview and a focus group interview. Digital consent is requested once they have been issued with the full scope of the expectations and implications of the study.

Finding and discussion

The primary aim of this research was to describe pedagogical approaches that design lecturers used, prioritised, or preferred in practical studio sessions during the transition to online learning. Each theme is presented using their own words as they recollected and shared examples that resonate with observations from the literature.

Application of modelling

It was evident that the lecturers followed the same pedagogical approach as in a face-to-face studio setting, where students could observe modelling and engage in discussions or ask questions. The first example is where they modelled the design approaches and problem solving. L3 talked about how he

would demonstrate how to measure a live model in a drawing studio by using a pencil. He modelled this in the online space by switching on his camera and physically showing students:

This is how you stand, this is how you hold the pencil, this is how you hold your arms straight and you kind of do the measuring and stuff like that (L3 Q20).

In another example, L4 mentioned shared:

I have an easel here behind me as well. So when we are painting and I'm physically showing techniques, I can still switch my or turn my computer so that I can show them how to do like for example, we're busy now with doing washes or colour blocking [...] I can still demonstrate that by doing it myself (L4 Q17).

One of the lecturers would pre-record themselves and demonstrate how to do something saying:

I would record myself doing the drawings [...] the kids said they couldn't see me or it's very laggy, so I had to kind of work through; okay, how can I get that information to them that is not being disrupted being disrupted by data or blurry images and I just ended up recording things (L3 Q20 -21).

This confirms Kvan's (2001) assertion that tacit design knowledge is compromised in online spaces, and asynchronous communication, involving asynchronous viewing of recordings and private messaging at different times, becomes the norm.

Another lecturer used previous students' work to showcase what worked and what did not, saying:

Show past work and discuss it with the students" [...] The lecturer's goal with this was to "to have them (the students) understand why that work was successful in the way that the design problem was approached (L2 Q9).

Lecturers also encouraged students to model by demonstrating to their peers how they approached a design. In line with Pektaş (2015), peer-to-peer learning in the online environment was highly beneficial, promoting student-focused learning and effective knowledge acquisition.

Application of coaching

Lecturers employed various methods in the online environment to uphold the integrity of design pedagogy while implementing their coaching methods. They consistently provided timely feedback, hinting, and guidance on previously unreleased methods, aiming to deliver feedback in the moment, either privately or publicly, where students could hear or see the feedback on a public platform.

Lecturers applied the coaching method by guiding and hinting to remind the students of techniques and approaches when they are in the problem-solving process. Lecturers were aware of their input and that too much can cause students to imitate rather than interpret and apply it in their own way evident in the following statements:

So maybe, initially, I've given them an idea just to explain or try and have them understand why theirs is not working, but then as the brief progressed, I've seen students just taking that concept and kind of going with it. I try and avoid that words like; I think you should [...] Because, yes, we tend to do that and then students don't really care about learning; they just want to please you to get the marks (L2 Q26)

I show them different methods but I wouldn't like just show them one and from start to end because then I'm almost certain I'll get standardised designs (L5 Q51)

Hammershaimb (2018) reported that such behaviour is not uncommon in design studios, whether online or face-to-face, as students often prioritise pleasing the lecturer over embracing the learning

experience that critique brings to the studio environment. Lecturers observed the same phenomenon when students would share their work to show their ideas and progress as part of coaching and other students would imitate these ideas:

I had an occasion where we did a bit more sharing, and then I ended up with eight of my eight students all having whitewashed flooring in their space (Fg Q95).

As a result, students displayed reluctance to share their work or collaborate with others. Smith (2022) confirms that this issue has long been problematic in design studios, where students are encouraged to engage with one another but often hesitate to rely on their peers due to concerns about idea theft or duplication, leading to isolated creative moments. According to the findings, the lecturers addressed this challenge by providing opportunities for students to self-assess, reflect on their work, and critique and analyse professional problem-solving approaches, both individually and concerning their peers' work. This process was intended to discourage copying and merely seek to please the lecturer, as suggested by Dutton (1987). Although the lecturers implemented these strategies, they did not seem to explicitly realise or mention the effectiveness of these measures in addressing the issue of students "stealing" ideas from their classmates.

Application of scaffolding

Scaffolding involves a lecturer providing assistance and support in tasks that students are still unfamiliar with and gradually reducing this support (fading) as students gain confidence and take on greater responsibility for their learning (Ding 2008). Based on the findings of this study, the application of scaffolding was intertwined with the modelling and coaching methods employed by these lecturers as they progressively reduced the level of support as the academic year progressed. For instance, the lecturers would extensively demonstrate each step of a design process for novice students but gradually decrease their modelling as the students gained proficiency in their work as evident from:

In term one, they're so new to everything and it's such a daunting feeling getting an assignment and having to do something for it or having to do the research. So I'm always there with them every step of the way in term one but that starts to fade out in term two and term three where I feel like; you now know how to approach an assignment, you know how to gather information, you know how to work to come up with ideas. So I kind of let go of the reins a little bit on some of the assignments (L3 Q50).

Oriol et al. (2010) warned against excessive support as it can hinder a student's exploration and learning, whereas insufficient support can impede their progress. Therefore, scaffolding is only effective if the lecturer accurately assesses the student's skill level.

Occurrence of articulation

According to the lecturers, articulation starts with them asking their students to comment on, explain, and give their opinion on how a design problem was approached and solved.

I do encourage my students before they even start with a brief, they need to explain verbally, and use visual examples in support what they are going to do, how are they going to approach this creative problem (L2 Q27).

The lecturers seem to prefer verbal articulation, which happens when students share their work with the class in an online class discussion, and lecturers can give direct verbal feedback in these online discussions that prompt the students to explain their choices and further articulate their methods and thinking:

So they'll have to show me progress; what they've done, why they've done that. And then there's almost a discussion where I can give them feedback but they can also give input as to why they've made those choices, what was their thought process behind creating that image or whatever the brief is about (FG Q70).

Some lecturers asked their students to model or demonstrate design techniques or how they approached a design problem; students also articulated their knowledge.

I started to have the students demonstrate painting and drawing or any interesting technique in class by switching on their computer (FG Q128).

According to García-Cabrero et al. (2018, p. 14), "*students need opportunities to verbalise their understanding to consolidate and expand their mental representations*". The findings revealed that lecturers understood the importance of students articulating their thinking and approaches as these lecturers created many opportunities for their students to verbalise their knowledge when asked to share their work in formative assessment.

Occurrence of reflection

While articulation and reflection are interconnected, it is important to note that articulation encompasses more than just verbalising the outcomes of reflection. There seemed to be an absence of reflection from the lecturers' point of view as they mentioned that "*this is a component that I don't do enough in my class*" (L2 Q31). However, it seems that the lecturers' understanding of what reflection entails might not be very clear as one of them admitted that "*I think reflection has been in projects, maybe I've just not realised that it is a reflection component*" (L2 Q32).

After the focus group interview, it became clear that the lecturers do not have a clear understanding of reflection and confused reflection with articulation. After listening and reading through their transcripts, I found that reflection is part of their pedagogy, even if they did not realise it. Reflection starts with the lecturer and happens mostly through lecturer encouragement, although there are some occasions where students spontaneously reflect on their learning. Lecturer 4 recalls:

It's not like I encouraged this or initiated this, rather; somebody just spoke up and said they enjoyed that and then the rest sort of jumped in. So, some students sort of initiate things happening in class as well, or debates happening (L4 Q42).

This spontaneous sharing happens after the students have completed their assignments. In these reflections, the lecturer encourages their students to think about what they have done and the steps they took to get to their final design and reflect on their experience and what they have learned in this process. According to lecturers, reflection happens mostly in online spaces:

A lot of students jumped onto blogs last year and this year, where they put all their process on blogs where they have research and their notes and reflections and examples of work or inspiration (FG Q194).

Students are also encouraged by their lecturers to reflect specifically on the feedback they receive after a summative assessment. This reflection method is not made mandatory but put forth as a choice to the students:

I think it helps when I give them written feedback and then I have a conversation after that and then it gives the student the opportunity to actually reflect on what they could have done differently (FG Q73).

This distinction is evident in the findings, highlighting how the lecturers encouraged both Articulation and Reflection. Oriol et al. (2010) and Collins and Kapur (2014) elaborate on this difference, explaining

that Articulation involves students expressing their thoughts (verbally or non-verbally) during the design process, discussing their choices, while Reflection entails students looking back on their actions, verbally or non-verbally evaluating the outcomes of their choices, and considering alternative choices that might have been more effective.

García-Cabrero et al. (2018) emphasise the need for students to articulate their understanding to solidify and expand their mental representations. The findings reveal that the lecturers recognised the importance of students articulating their thinking and approaches. They provided numerous opportunities for students to verbalise their knowledge during formative assessments when sharing their work.

Regarding reflection, the findings demonstrate that the lecturers were highly aware of its significance and the role it plays in helping students make sense of their knowledge and take ownership of their learning. Collins and Kapur (2014) outline three forms of reflection:

- 1) reflecting on one's process,
- 2) comparing one's performance to that of others, and
- 3) comparing one's performance to a set of evaluation criteria.

When examining the findings, the reflection encouraged by the lecturers primarily focused on students reflecting on their own process. Reflection, as indicated in the findings, mostly occurred as part of or following summative assessments. Students would verbally reflect on their methods and outcomes during their final presentations, and there were also opportunities for verbal reflection on the feedback received from lecturers and peers.

Collins and Kapur (2014) suggest that technology can enhance reflection, enabling students to review their own work and that of others in greater detail through recordings. However, the findings did not mention the use of recorded sessions or recording functions as part of the reflection process in the lecturers' online pedagogy.

Implementation of exploration

Exploration plays a significant role within the design education studio-based culture (Tovey 2015). Lecturers recognised that exploration is best introduced later in the academic year when students have developed some skills and may feel more confident in their decision-making abilities. *"It's more in semester two that I start to let the reigns go a little bit and allow students a bit more freedom"* (L5 Q53). This aligns with Dickey's (2008) findings, which suggest that students who undergo appropriate scaffolding methods develop the skills and confidence to rely less on the lecturer and course materials, enabling them to engage in more independent exploration using external resources.

Exploration was unavoidable in the online environment; students were faced with the challenge of not having access to studio-provided resources and were forced to improvise:

I would let's say like we were struggling with silk screening, they couldn't get the materials and then allowing them to find another solution to that problem and creating their own technique to get to the same sort of outcome and explaining that to the class (L4 Q33).

Furthermore, the lecturers felt that the online environment encouraged exploring new methods and ideas among their students as their students saw each other's work more frequently online:

They (the students) went all out. I don't know if it was because they could see each other's work in this online platform, and they could like kind of compare it a little. I also think with the open-mindedness, if one person does something really good, it's kind of like everybody else has to do just as good.

Although the experience of exploration is mostly positive, some lecturers felt that not all students benefit from open briefs or no limits, as they might feel lost and start asking for more guidance:

But sometimes when you give them that freedom or the chance to be as creative or self-sustainable as possible, they're like; oh, I'm so lost, I don't know where to go (FG 78).

The challenges lecturers and students faced in the online environment provided opportunities for the implementation of exploration. The literature suggests that timely implementation of exploratory practices "encourages students to advance problem-solving to the next level" (Oriol et al. 2010) and that students should be "encouraged to initiate projects, defining and exploring their own areas of interest" (Hardman 2017) to develop into successful designers.

Conclusion

By employing the Cognitive Apprenticeship Model (CAM) as a theoretical framework, this case study provided a clear and comprehensive understanding of the pedagogical approaches used by lecturers during the rapid transition to online learning during the COVID-19 pandemic. These approaches were explored in relation to existing literature and situated within the context of design education practices in both in-person and online sessions. Despite the lecturers' lack of awareness of the CAM, they inadvertently incorporated cognitive apprenticeship methods into their online teaching of practical-oriented design subjects. The findings described how lecturers effectively used information and communication technology to mediate teaching methods such as modelling, coaching, scaffolding, and exploration.

This description of design lecturers' pedagogical approach to practical studio sessions during the rapid transition to online learning calls for further investigation into the effectiveness of these approaches and their impact on student learning. In particular, lecturers did not understand the distinction between methods of articulation and reflection, and more work can be done to support lecturers in these areas in the future. These findings also raise questions about the future of design education practices as a studio-based pedagogy and the advantages and disadvantages of various modes of delivery.

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SESSION 5: Doing





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Fostering design students' professional confidence for workplace success through transdisciplinary online collaborative problem-based learning

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Abstract

This paper builds on previous research and the insights gained from thematic analysis of reflections by students and educator panels on an online collaborative problem-based learning (CPBL) project across four campuses at a South African private higher education institution. The research found a strong connection between student and educator reflections and reveals that collaborative project-based learning (CPBL) is crucial to building students' confidence in transdisciplinary collaboration within a real-world online setting. Consequently, the researchers begin this paper with a proposed *framework for fostering confident transdisciplinary CPBL online*. The interrelated insights obtained from the longitudinal study thus form a foundation for the researchers to delve deeper into the experiences of disciplines and, in this instance, the reflections of design educators and project designers on how transdisciplinary CPBL can nurture soft skills for workplace success. Soft skills, which are transversal or non-technical and cross-disciplinary, are often unnoticed by lecturers and not evaluated in tests or projects. The paper contextualises Royo's taxonomy (2019) and soft skills mentioned in the literature that are further enhanced through CPBL. The research focuses on *communication, teamwork, and a positive attitude*.

Thematic analysis of the reflections of design lecturers and programme developers (2023) reveals an embedded confidence, but also discipline-specific lines of tension in the collaborative thinking and doing of design students. The responsibilities of educators as transdisciplinary facilitators emerge in the approach and practices of project panels and in the critical role of supporting students to articulate their professional self-efficacy and to express their professional worth confidently and effectively. Project design also plays a critical role in this regard. The research considers the nature of confidence within and beyond disciplines and reveals that, ideally, all study programmes should be sufficiently latticed to ultimately enable online transdisciplinary collaboration.

Keywords: Collaborative problem-based learning (CPBL), soft skills, transdisciplinary project.

Introduction

Collaborative problem-based learning (CPBL) has become essential in an online post-COVID pandemic World of Work environment. Thus, graduate talent must have the confidence and competence to participate and perform in transdisciplinary online collaboratives (Deloitte 2021), and collaborative

co-design approaches in contemporary curricula must develop analytical and critical thinking; complex problem-solving; resilience, stress tolerance, and creativity (Lee et al. 2019; McAra & Ross 2020; Moreira 2018; Rowe 2020; World Economic Forum 2020). However, few studies have investigated the pedagogical or technological approaches that can be used to facilitate CPBL online (Fleischmann 2020; Marshalsey & Sclater 2020; McLachlan & Tippett 2023).

This paper builds on previous research (Cronje & Enslin 2023) and the insights gained from a qualitative thematic analysis of reflections by students (187 reflective essays – 2021) and educator panels (seven focus groups – 2022) on an annual online collaborative project across four campuses at a South African private higher education institution. The research specifically aimed to explore experiences in collaborative problem-based learning (CPBL) online.

The study found a strong connection between student reflections and educator focus groups (Appendix A), confirming the importance of CPBL in fostering student confidence and engagement in online transdisciplinary collaboration. It also highlights the crucial role of educators in problem-solving and creative solution development. This research paper presents the interrelated insights obtained from thematic analyses and delves deeper into the experiences of design educators and project designers.

The researchers present a framework that highlights the systemic nature of key insights gained from analysing student reflections and educator discussions. This framework serves as a foundational argument for transdisciplinary CPBL. It suggests that when students develop a strong sense of professional identity and team members share the same, confidence, respect, and effective collaboration can emerge. This, in turn, enables the development of original and meaningful solutions to complex real-world challenges.

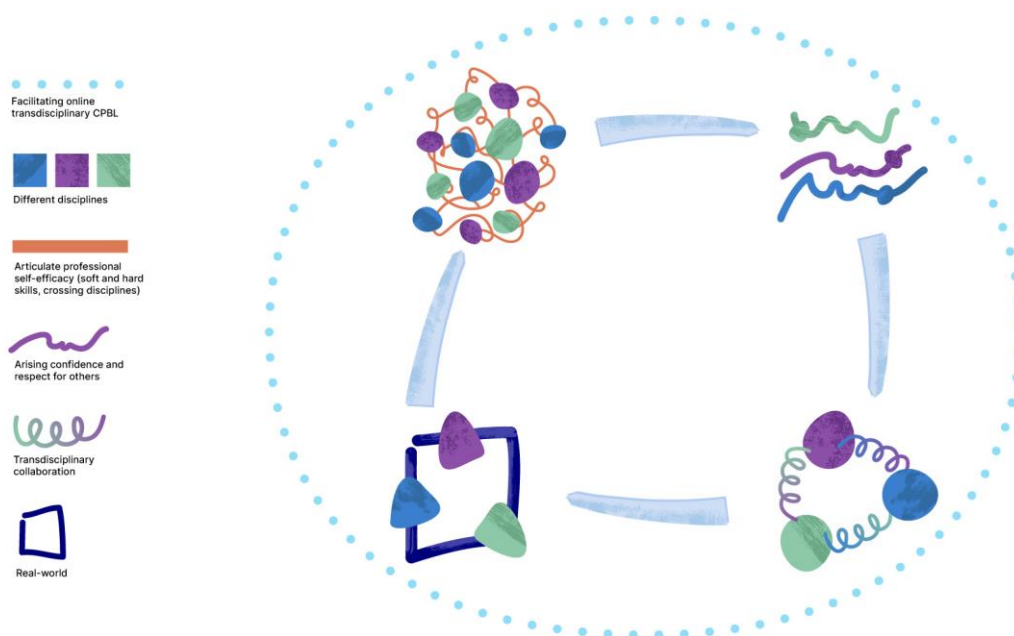


Figure 1: Framework for fostering confident transdisciplinary CPBL online

Therefore, transdisciplinary cooperation for problem solving and the development of creative solutions requires the considerable responsibility of educators. In essence, the research reveals that the central role emerges in facilitating students' and team confidence to participate and perform in

an online real-world transdisciplinary collaboration. In general, it positions educators with the responsibility to produce graduates better prepared for the industries they are about to enter.

Taking into account the above-mentioned insights and the proposed framework through a constructivist lens, the researchers concluded that educators who guide and support cross-disciplinary CPBL projects should assume important responsibilities and active roles in: (i) **building trust within individuals and teams** while maintaining a firm focus on the application of the required skills to address a complex challenge; (ii) **guiding individuals towards establishing a clear sense of identity and professional worth** within their cross-disciplinary collaboration teams, (iii) encouraging the emergence and growth of **mutual respect and positive team dependency**; (iv) facilitating **collaborative thinking** to enable all disciplines to come into play in order to construct original and meaningful solutions to such challenges (Cronje & Enslin 2023). It is as Padurean and Cheveresan (2010, p. 127) reason, the confidence in individual students and teams that motivate them to **explore beyond their own disciplines and collaboratively find innovative and significant solutions for complex challenges**.

Reflections from both students and educators mostly converged on the **orientation phase** of a transdisciplinary CPBL project. The research thus reinforces the views of Han and Resta (2020) and Kauppi, Muukkonen, Suorsa and Takala (2020) in flagging the crucial influence of establishing guidelines and support in preparation for social interaction and collaboration online. The orientation phase of the online transdisciplinary CPBL should provide students with the opportunity to share and acknowledge their unique professional identities and personal skillsets from the beginning. Hence, the proposed framework for fostering confident transdisciplinary CPBL online.

The importance of soft skills is evident for students and educators in transdisciplinary online collaboration. This paper specifically explores how design lecturers can facilitate collaborative problem-based learning to enhance student confidence in online projects. Two focus groups were conducted in 2023: one with design lecturers who participated in previous project panel focus groups (2022), and another with developers of the design programmes involved in the online collaboration. Both groups built on insights gained from previous research for a deeper discussion (Hall 2020).

Soft skill development with CPBL

When the concept of soft skills, or 'transversal and non-technical skills' (Joie-La Marle et al. 2023, p. 1) emerged in 1972, little consensus could be reached on a precise definition. However, fifty years later, various researchers have created a number of taxonomies and descriptions of the concept. Joie-La Marle et al. (2023, p. 18) categorise them into emotions (emotional expression, awareness, positivity and emotional skills), interaction and relationship (non-verbal communication, influence, human management and conflict management) with other skills that seem to be more cognitive-based such as quick learning, strategic thinking, and awareness of detail. More recently, soft skills are frequently mentioned in the context of adaptability, such as dealing with stressful situations in creatively solving problems (2023, p. 4).

The 21st century skills framework (Stehle & Peters-Burton 2019) identifies a set of skills essential for success in the modern world, including critical thinking, communication, collaboration, creativity, and problem solving. Furthermore, in an analysis of the soft skills that employers require from 21st-century employees, Royo (2019, p. 8) identified ten categories, namely communication, time management, teamwork, research, goal setting, leadership skills, creative thinking, positive attitude, assessment, and a strong work ethic.

We argue that the inherent ability of PBL to build interpersonal skills, communication skills and confidence, works toward the ‘improved interpersonal skills necessary for thriving in a teamwork setting’ (Landrum 2020, p. 7) and therefore connects with the 21st-century skills framework (communication, collaboration) toward professional readiness (Stehle & Peters-Burton 2019). The framework emphasises the integration of soft skills with academic content, the application of knowledge and skills to real-world problems, and, as researchers argue, the need to facilitate soft skills development among students working in groups (CPBL) (Deep et al. 2020; Najah et al. 2019; Nurtanto, Fawaid & Sofyan 2020; Royo 2019).

The results of the research honed the focus on three aspects contained in Royo’s taxonomy (2019), namely all modes of communication, teamwork skills (interpersonal skills, active listening, cooperation and flexibility), and a positive attitude (confidence and inspiring team members). In order to contextualise the results of collaborative work and soft skills of the 21st century, the graphic below contains all aspects of Royo's taxonomy on the right, as well as those soft skills mentioned in the literature that are further enhanced through CPBL, on the left (Deep et al. 2020; Najah et al. 2019; Nurtanto, Fawaid & Sofyan 2020).

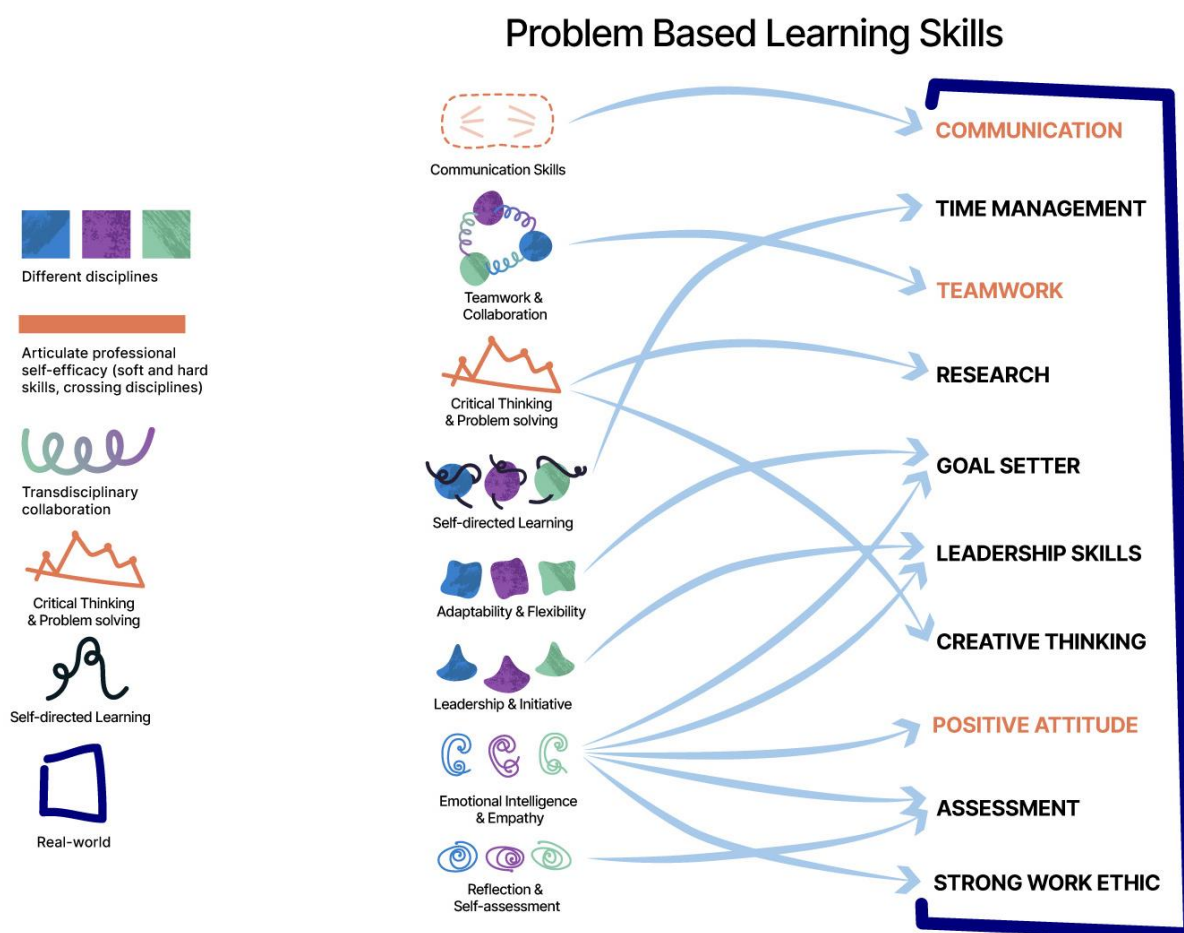


Figure 2: 21st-century employee requirement categories

Evidently, no theoretical framework fully captures the complexity of soft skills development in PBL. Educators can draw upon multiple frameworks and adapt them to their specific pedagogical context and learning objectives (Kamis 2007). Additionally, theories, such as Transformative Learning Theory

(Kohonen in Little et al. 2003), Self-Determination Theory, or Situated Learning Theory (Gómez Puente, Van Eijck & Jochems 2013), may also provide valuable insights to support of soft skills development in PBL.

In the case of this research, social constructivism forms a natural fit for OCPBL. The emphasis is on the social essence of knowledge construction Harasim (2012, p. 70) and, as Geitz and de Geus remind us of Vygotsky's Constructivism Theory, 'knowledge is co-constructed in a social environment' (2019, p. 2). Soft skills are not only individual attributes but are also shaped through social interactions and the sharing of diverse perspectives. Students also engage in reflection on their group interactions and problem-solving approaches, and actively experiment with different strategies (Deep et al. 2020). Social constructivism supports the development of soft skills by providing experiential opportunities for students to practice and refine their communication, teamwork, critical thinking, and problem-solving abilities. Kolb's approach then also explicitly positions confidence development as a central aspect of the experiential learning process and is made up of a continuous cycle of concrete experiences, reflective observation, abstract conceptualisation, and active experimentation (Kamis 2007). Learners are encouraged to apply their knowledge and skills in real-world settings or simulations, to engage in hands-on experiences, take risks, and try new approaches in order to gain a sense of mastery and confidence in their abilities. Successes and failures encountered thus contribute to the development of confidence and self-efficacy (Acevedo-Osorio, Hofmann-Souki & Cruz Morales 2020; Huttunen in Little et al. 2003).

Research method and analysis

Exploring how the confidence of design students and the accompanying soft skills for workplace success can be nurtured through transdisciplinary CPBL online, this paper reports on a thematic analysis of the reflections of design lecturers and programme developers (2023) on the key insights gained from previous research cycles, as well as their own lived experiences. Two focus groups were conducted (2023). The first involved the design lecturers who served on the educator panels in the project under study and the second involved the developers of the design programmes involved in the transdisciplinary CPBL online. These transcripts were then thematically analysed in order for the prominent themes to crystallise (Nowell, Norris, White & Moules 2017). The researchers obtained institutional ethical clearance and used anonymous verbatim quotes only to illustrate the discussion (Jowett 2020).

Thematic analysis: Design educators and programme developers

The focus group of design educators agreed from the outset with the findings of prior research, stating that the challenge is universal for students across all disciplines: **collaborative project-based learning (CPBL) is crucial for building students' confidence in transdisciplinary collaboration within a real-world online setting**. However, participants noted that design students face additional tensions. While they are already somewhat experienced in collaboration due to their discipline – *'design students are used to working together across disciplines'* – they may struggle to encourage effective collaboration within less experienced or less confident transdisciplinary teams. This often leads to the demarcation of roles and responsibilities, hindering the team's ability to function cohesively. Consequently, design students can feel isolated towards the end of a project: *'This is not how [collaboration] works'*. In order to address these concerns, the participants discussed two key points. First, they stressed the importance of introducing collaborative projects early in students' study programmes. Second, they highlighted the potential impact of educator panels on students' confidence to participate in collaborations. The design lecturers reflected that panels can inadvertently reinforce disciplinary silos

if members do not transcend their disciplines in working together effectively – ‘surely it all depends on how lecturers are seen working together?’

This discussion group, reflecting on the key insights gained from the series of focus groups with panel members from all disciplines, concluded that:

Table 1: Design lecturers' conclusive insights

The Project Design Team	
A transdisciplinary project design team must remain attentive to the level of exposure that students from different disciplines may have experienced on project-based collaboration. Ideally, study programmes should be sufficiently latticed to ultimately enable online transdisciplinary collaboration.	
Students in Teams	Educator Panels
Students must gain knowledge and insight in their understanding of “what other disciplines actually do”. The lecturers proposed that the orientation stage of the project should actively encourage students to share their professional profiles and portfolios, preferably by example of the strategic and creative work produced.	Project educator panels must be orientated in holistic transdisciplinary engagements with fellow panel members and student project teams.
Students and Educator Panel Members	
That the principles of collaboration be reinforced among students as well as panels from the very onset of a transdisciplinary project.	

The focus group with design programme developers explored insights into key research findings and the thoughts of design lecturers regarding their project experiences. They discussed the sense of collaborative confidence and natural proficiency of design students to contribute effectively to all aspects of the transdisciplinary project – *‘they have got a strategic role to play as well’*. Also, design students are accustomed to *‘thinking and doing’* and to *‘do, reflect and move on’*. However, participants reflected on two sets of soft skills that they observed design students to struggle with, despite their previous experience and confidence as collaborators. That is, they may not always have the skills to *‘practice empathy’* meaningfully, nor to *‘frame and deliver (their) message’* effectively. This observation aligns with previous research (Cronje & Enslin 2023), and the self-reflections of students on the specific skills that they wish to develop to become *‘a future confident self’*.

Focus group participants discussed the confidence of design students, concluding that these students *‘just passionately want things to work and work the best way it can’*. They find it especially difficult when *‘near derogatory’* statements or instructions belittle their skills and abilities.

The design programme developers concluded that online CPBL requires transdisciplinary awareness of professional identity beyond the skill set and should facilitate authentic collaboration with orientation phase exercises that uncover and gamify *‘capabilities beyond the box’* – *‘pitch your value to the team’*. A participant encouraged the collective to critically reflect on the current project ‘icebreaker’, which requires students to create a team identity, including assigning specific ‘job’ roles to individuals. Might this not be counterproductive to the transdisciplinary collaborative orientation that the project requires? Participants supported the idea of having two to three experienced educators who excel in transdisciplinary team collaboration and proposed that educator panels could always seek input from discipline experts when needed. The programme developers explained that such educator-panels would possess the experience to facilitate real-world CPBL online and ensure optimal authentic learning through client engagement with student teams.

Discussion and conclusion

The longitudinal study presents an alignment between the reflections of students, educators, and programme developers and posits that CPBL is fundamental to building the confidence of students to participate and perform meaningfully in a real-world transdisciplinary collaboration online. The research also highlights the significant responsibility of educators in fostering the professional confidence of students in workplace success through transdisciplinary online CPBL.

The proposed *framework for fostering confident transdisciplinary CPBL online* presents the individual student's sense and expression of professional self-efficacy and, consequently, that of team members, as essential to fully collaborate and to develop original and meaningful solutions to complex real-world challenges. Therefore, educators, programme developers, and project designers must consider every aspect of a CPBL project in relation to its role in building student and team confidence and facilitating transdisciplinary collaboration. Focus groups with design lecturers and programme developers suggested that design students are versed in collaboration, have a '360' role to play and '*just passionately want things to work and work the best way it can*'. However, a holistic reflection on all disciplines and project variables is a key requirement, as any individual team member or project dimension can (in)advertently create or reinforce specialisation silos and stereotypes that stand in the way of confidence of students' to perform and participate in a transdisciplinary collaboration. For example, the research flagged the influence of panel member feedback styles and approaches, which may enhance or dilute student and team confidence to participate in full and potentially collaborate on transdisciplinary levels.

The thematic analysis of design lecturers and programme developers' reflections amplify the influence of Joie-La Marle et al.'s (2023, p. 18) category of emotions (emotional expression, awareness, positivity and emotional skills). However, the research also reveals that CPBL scenarios should facilitate students to express their professional worth confidently and effectively, in addition to actively listening to others, communicating their ideas, and engaging in constructive dialogue (Deep et al. 2020; Najah et al. 2019; Nurtanto, Fawaid & Sofyan 2020). The research thus contributes to the thinking of Deep et al. (2020) by identifying not only the influence of students, but also educators and programme developers on problem solving, group interactions, and actively experimenting with different strategies to improve transdisciplinary collaboration. Considering that the real-life transdisciplinary online CPBL under study presents active experimentation, our research in essence confirms, as Kolb (Kamis 2007) and Royo (2019) suggest, that confidence building is an integral part of the learning process. Leaning on Royo's soft skills that employers demand from 21st-century employees, this research emphasises the role of a positive self-confident attitude in fully collaborating. We posit that a transdisciplinary and online environment potentially magnifies this requirement and the educator and project designer's responsibility to facilitate individual and team confidence to collaborate. In order to build the confidence to engage, to take risks, and try new approaches (Acevedo-Osorio, Hofmann-Souki & Cruz Morales 2020), educators and project designers must facilitate student awareness and articulation of professional identity beyond specialisation-specific skills, to build self-efficacy and respect for others.

The research reveals that, ideally, all study programmes should be sufficiently latticed to ultimately enable online transdisciplinary collaboration. Considering Experiential Learning Theory, CPBL then presents a continuous cycle of concrete and active experimentation (Huttunen in Little et al. 2003). With regard to facilitating online transdisciplinary collaboration, the thematic analyses suggest that

- A transdisciplinary online CPBL project should actively support students in exploring, defining, and articulating their professional value appropriately. Such articulations should share and enable the practice of hard and soft skills that confidently cross disciplines.
- The orientation stage of a transdisciplinary online CPBL project should actively encourage students to share their professional value through profiles and portfolios.
- Project icebreakers should facilitate and not counter-transdisciplinary professional identity development.
- Project educator profiles, panel composition and facilitation styles should transcend discipline specifics, and that
- Educator panels should be orientated in holistic transdisciplinary engagement with fellow panel members and student project teams.

The results of the focus group discussions beg the question: What does confidence look like for students, educators, and programme developers from different disciplines? For the design student, the team-tendency to delineate roles and responsibilities when the going gets tough presents a particular challenge that requires continuous facilitated exploration of confidence and soft skill development. For educators responsible for the facilitation of transdisciplinary CPBL online, there is a unique opportunity to take advantage of the embedded confidence of design students in thinking and doing, reflecting on, moving on, and engaging all students to further develop this professional capability. Exploring the sense of confidence of students from different disciplines in relation to one another presents a further potential source of insight into the promotion of 21st-century graduate skills in transdisciplinary online collaboration.

Illustrations

The authors thank Anka Joubert for the design of Figures 1 and 2.

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Appendix A

Table 1: Previous research: Alignment between themes (students and educators) (Cronje & Enslin 2023).

Student reflections (2021)	Educator reflections (2022)	Tier descriptions
Theme 2: I've learned a lot about me	Theme 1: The real-world 'unknowns', an 'exercise in confidence'.	Tier 1: Educators predominantly deliberated evolving levels of individual and team confidence upon the progression of real-world transdisciplinary collaboration, and many student reflections revealed authentic learning towards work readiness and a future-confident self.
Theme 1: All disciplines and three years came into play Theme 5: Challenge and discovery	Theme 2: All specialisations come into play; the 'aha moments' Theme 4: 'This is how real-world teams are being built' but we 'miss' the face-to-face interaction	Tier 2: Educators in focus group discussions noted students' realisation of project interconnections and interdisciplinary benefits. Students value diverse specialisations for meaningful, original solutions to real-world challenges.
Theme 3: A code of conduct Theme 4: The matter of time	Theme 3: 'Individual worth', mutual potential	Tier 3: The educator reflections were mostly focused on students deriving a clear sense of identity and true value within their teams to engender mutual respect and positive dependency. As far as the students were concerned, respect for the perspectives and skillsets of their counterparts mostly emerged from their experience of productive transdisciplinary collaboration and collectively making progress on the project.

One aspect that was prominent in student reflections but received less attention in the teacher focus group analyses was the concept of time (**Theme 4**). Students frequently made authentic references to it, such as mentioning instances when they came very close to missing deadlines, which led the team to stress. Consequently, many reflections emphasised the importance of establishing effective principles for managing time. Conversely, a different aspect emerged during the focus group discussions with teachers, which students did not widely acknowledge. In 2021, due to the COVID-19

pandemic, this collaborative effort across disciplines transitioned to an online format and has remained online ever since. It was generally perceived that the students involved were better equipped for the industries and roles they were entering. Some educators retained reservations about this (**Theme 4**).



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Speculative futures: Questioning nanotechnology and sustainable development through industrial design pedagogy

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Abstract

The Fourth Industrial Revolution (4IR) is rapidly blurring the lines between the physical, digital, and biological worlds through advances in artificial intelligence (AI), robotics, and other technologies. While Industry 4.0 is transforming our future realities, it is essential not to lose sight of human needs and basic human rights. Development must balance social, economic, and environmental sustainability, which is why designers need to engage with ethical considerations and social realities. One example of a technology that has both potential benefits and ethical threats is nanotechnology. Nanobots, machine versions of bacteria or viruses, can perform pre-programmed tasks autonomously at the atomic level. While nanotechnology has the potential to address inequalities, climate change, and diseases, it also poses ethical threats to society. Higher education programmes must prepare students for these ethical conundrums, especially in a rapidly changing industry driven by technology.

Speculative Design (SD) is a way to engage students in the future implications of the relationship between science, technology, and humans. It proposes provocative future scenarios that spark debate. In order to prepare students for the changing industry driven by technology, an undergraduate project explored the use of AI as a tool in speculative design. Students imagined advancements in nanotechnology linked to a specific SDG and proposed provocative future scenarios through a realistic magazine-type advertisement. The project aimed to balance technological progress with social, economic, and environmental sustainability and prepare students for ethical considerations and future implications. Through SD, students critically explored and reflected on social challenges and opportunities, a shift in approach to design education that emphasises speculative and theoretical exploration and reflection compared to traditional skills-based methods.

This paper reports on the project outcomes, student reflections, and key findings. Furthermore, it emphasises the importance of balancing technological progress with social, economic, and environmental sustainability and engaging students in ethical considerations and future implications through SD. The research paper argues that the integration of SD in industrial design pedagogy has the potential to foster a critical and reflective approach to design practice that is essential for addressing the complex challenges of sustainable development in today's world.

Keywords: 4IR, artificial intelligence, nanotechnology, speculative design, sustainable development goals.

Introduction

The Fourth Industrial Revolution (4IR) has ushered in a new era of unprecedented technological advancements, blurring the lines between the physical and digital worlds. Artificial intelligence, robotics, and nanotechnology are among the key drivers of this revolution, promising transformative solutions to pressing global challenges (Ade-Ibijola & Okonkwo 2023; Kraemer-Mbula & Lorenz 2022). Within the realm of technological innovation, nanotechnology holds tremendous promise. Nanobots, machine versions of bacteria or viruses, have the capacity to perform pre-programmed tasks autonomously. This capability presents an array of potential applications, including addressing inequalities, mitigating climate change, and combating diseases. Yet, as with any powerful technology, nanotechnology also poses significant ethical threats to society, ranging from concerns about privacy and security to the potential for exacerbating social inequalities.

While Industry 4.0 is transforming our future realities and we embrace the potential benefits of these technological breakthroughs, we must not lose sight of human needs and basic human rights. As designers and educators, it is crucial to reflect on the ethical and social implications of technological advancements, particularly in the context of sustainable development. Industrial Design pedagogy plays a pivotal role in equipping future designers with the necessary knowledge, skills, and critical mindset to navigate the complex challenges of sustainable development (Mokgatla & Moseley 2022, p. 277). Higher education graduates of 4IR should not only be equipped with the technical skills required but must be equipped with the critical thinking skills needed to utilise emerging technology sustainably and ethically (Penprase 2018, p. 220). Design educators should therefore reflect and reimagine their curriculum and teaching practices to foster critical and reflective design approaches. The integration of critical design methodologies – the practice of envisioning alternative futures and provoking critical discourse – is one such approach.

This paper presents findings from the first cycle of a larger action research inquiry that explores the efficacy of integrating critical design concepts in Undergraduate industrial design projects. This project cycle tasked students to imagine possible utopian and dystopian futures of nanotechnology through the lens of sustainable development.

Context

In light of much technical advancement, there is much mention of the Fourth Industrial Revolution and its importance in development and furthering technological advancement. However, for developing countries, there are no real insights on how to apply or take advantage of the 4IR appropriately (Ade-Ibijola & Okonkwo 2023, p. 102; Kraemer-Mbula & Lorenz 2022, p. 39; Sutherland 2020). In a world where the industry is rapidly developing to keep up with the trends of the 4IR, our students should not be left in the lurch (Mokgatla & Moseley 2022, p. 277; Adelabu & Campbell 2020, p. 1), and it is, therefore, essential to keep up with these trends within the development of pedagogy (Kayembe & Nel 2019, p. 92; Adelabu & Campbell 2020, p. 1). The development of appropriate applications of emerging technologies needs to be rooted in local contexts and skills (Maisiri, van Dyk & Coetzee 2021, p. 12). This can only be achieved through the development of ready and able actors.

Speculative design proposes an imagined future relationship between science, technology, and humans (Auger 2013). These provocative design proposals are meant to initiate and trigger debate and discussions (Auger 2013; Nabuurs et al. 2023); therefore, speculative design lends itself to be used as a tool to challenge preconceptions (Auger 2013; Nabuurs et al. 2023). The project's aim is to achieve this delicate balance, acknowledging the potential benefits and dangers of nanotechnology in

addressing critical global challenges. Nanotechnology holds promise in tackling issues such as inequalities, climate change, and diseases through its potential applications in various fields, including healthcare, energy, and environmental remediation, wielding the transformative power of nanotechnology in creating a more sustainable future (Auger 2014).

However, alongside its potential benefits, nanotechnology also poses ethical threats to society that warrant careful consideration. The discussion critically examines these ethical challenges, addressing concerns related to privacy (Giri, Maddahi & Zareinia 2021, p. 13), security (Giri, Maddahi & Zareinia 2021, p. 13), environmental impact, and equitable access. By exploring these concerns, the research highlights the need for responsible and ethically conscious design practices in the development and implementation of nanotechnology. It underscores the importance of preparing students to grapple with these ethical conundrums in a rapidly changing industry driven by technology.

The integration of speculative design and industrial design pedagogy emerges as a powerful approach to addressing these complex challenges. Traditional skills-based approaches to design education often prioritise technical proficiency without sufficiently addressing design practice's broader societal and ethical dimensions. The project showcased in this research paper exemplifies how speculative design can engage students in critical thinking and reflection, fostering a more holistic and comprehensive understanding of the implications of emerging technologies. By encouraging students to question prevailing narratives and imagine alternative futures, speculative design enables them to develop a more nuanced perspective on nanotechnology's social, economic, and environmental impacts.

Methodology

In today's world, where products offer solutions to societal problems, it is imperative that designers create inclusive and appropriate solutions that are impactful to both the people and their communities and environments (Ade-Ibijola & Okonkwo 2023; Sutherland 2020). In preparing our students for the world we live in, we need not only to equip them with skills and knowledge that match their contexts, but it is also important that they are equipped with critical consciousness (Watts, Diemer & Voight 2011, p. 44). This calls for a shift in approach to design education that emphasises speculative and theoretical exploration and reflection compared to traditional skills-based methods.

Framed within the critical paradigm (Asghar 2013), this research explores the incorporation of critical pedagogy and critical design methodologies in undergraduate design education as a means of developing critical thinking and reflective design practice among design graduates in the 4IR. Critical pedagogy is a strategy that aims to develop students' critical consciousness, understanding, and reflection, encouraging them to be active participants in their own learning, empowering them to become future agents of social change (Uddin 2019, p. 111).

Speculative Design is a Critical Design methodology rooted in critical thinking which aims to stimulate dialogue or spark debate by proposing future scenarios through satirical or thought-provoking design works (Dunne & Raby 2013, p. 2; Bardzell et al. 2012).

This research aims to explore the efficacy of integrating critical design concepts in Undergraduate industrial design projects, through iterative, practice-led inquiry. Action research (AR) is an educational research approach used by educators to examine, reflect on, and ultimately improve their pedagogy and teaching practice (Clark et al. 2020, p. 8; Sagor & Williams 2016). Given that this study aimed to assess the efficacy of integrating critical teaching methods into undergraduate curricula, this approach was deemed appropriate for the research.

This paper presents the first 'cycle' of this AR project. This cycle followed the four steps of AR, namely: Plan, Act, Observe and Reflect (Clark et al. 2020, p. 11, 12). The 'Plan' phase encompassed the development of the project brief and the definition of project requirements and assessment criteria. The 'Act' phase involved students executing the project brief, as described in more detail below. During the 'Observe' phase, lecturers assessed the project outcomes in accordance with the assessment criteria. As reflection is a crucial component of AR and generating reflective knowledge, lecturers and students were asked to reflect on the project (Schratz 1992, p. 83). Students were requested to complete unstructured written reflections and a semi-structured online questionnaire (Schratz 1992, p. 87). Subsequently, lecturers analysed these qualitative responses alongside their observations of project outcomes, sharing key findings, discussed in this paper, to guide the subsequent cycle. This methodological approach enabled the exploration of student experiences, insights, and challenges (Sagor & Williams 2016), contributing to the broader understanding of the potential of integrating sustainable development and speculative design in industrial design education.

Project brief

This research took place in the Department of Industrial Design at the University of Johannesburg. The project was undertaken by 37 first-year Industrial Design students, in both the Digital Media (2D Digital communication) and Engineering Media (3D CAD) modules. The project took place in the second term, once students had developed basic skills in the respective modules' prescribed software.

For this project, students were challenged to speculate possible utopian/dystopian advancements within the field of nanotechnology, aligned with specific SDGs, and present these speculated future technologies in the form of a realistic magazine-type advertisement, from the year 2040. Students were pre-allocated one of four pre-selected sustainable development goals (SDGs) from which they could identify a specific topic on which to focus their research and design. The pre-selected SDGs included SDG 3: 'Good health and well-being', SDG 5/10: 'Gender Equality'/'Reduced Inequalities', SDG 6: 'Clean water and sanitation' and SDG 7: 'Clean Energy'. Students in each of these groups were then split between Utopian and Dystopian perspectives.

This student design project was undertaken during the 'Act' phase of the AR cycle. The project had a 5-week duration and followed four steps: Research, Ideate, Develop, and Deliver. During the 'Research' phase, students had to conduct desktop research to familiarise themselves with the fundamental concepts of the brief, namely Technology (AI, 4IR, Nanotechnology), their allocated SDG as well as Utopian or Dystopian paradigms. In the 'Ideation' phase, students used keywords identified from their research to define prompts that they then used with image-based AI-generative tools to conceptualise their envisioned nanobot (Figure 1).

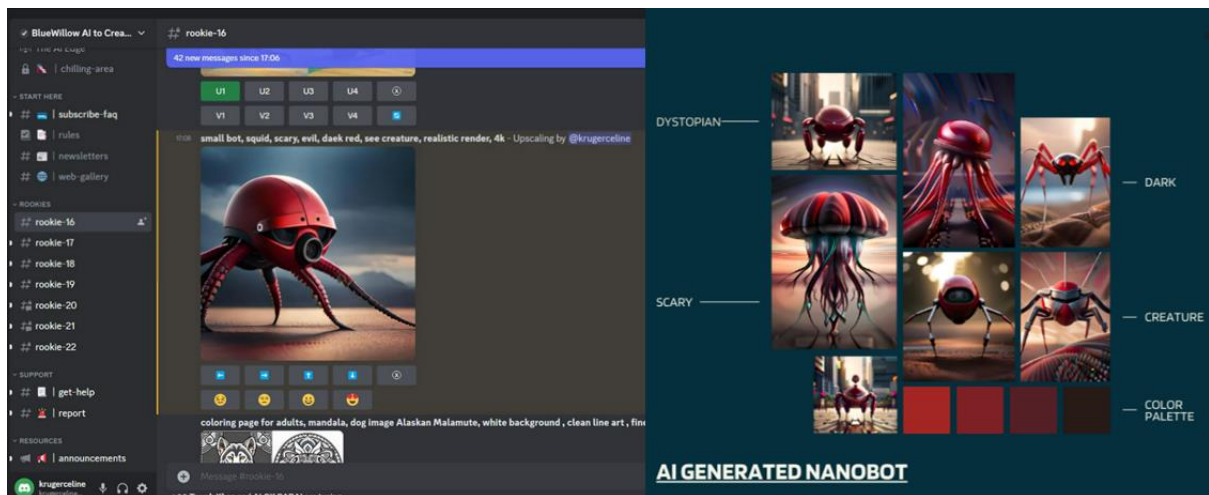


Figure 1: Student example of the AI image generation with Midjourney AI engine

A minimum of five AI-generated images had to be created using these prompts, from which one final Image/concept was chosen to develop further in the next stage. In the 'Develop' phase, students were required to test their newly acquired 3D modelling skills and recreate the chosen AI-generated design in SolidWorks. The final 3D CAD model was rendered to produce photorealistic images of the nanobot design. Finally, in the 'Deliver' phase, students used these renders, along with sourced background images and text, to create a Mixed-Media Advertisement in an open-source Bitmap editing software, GIMP. The final advertisements were presented with an accompanying 300-word write-up explaining the identified problem/opportunity and describing the nano-technology and message of their speculative design outcome.

Project outcomes

The 'Observe' phase involved lecturer assessment of project outcomes. This section presents a selection of project outcomes (3 Utopian and 3 Dystopian) to showcase the efficacy of the project and to provide context to the research findings and lecturer observations.

Utopian

In relation to technology, a Utopian future is one that regards technology as the medium through which positive social transformation can be achieved (Eskelinen, Lakkala & Laakso 2020; Reuter 2022).

Advert 1: The first nanobot in Figure 2 takes inspiration from starfish in both form and function through biomimicry. With a specific focus on addressing SDG 6 concerning clean water and sanitation, the student conceptualised a nanobot designed to filter, absorb, and compact nano-plastics present in our water sources.



Figure 2: Starfish nanobot for water cleaning and sanitation

Advert 2: iCAN (Figure 3) is a nanobot equipped with sensors and a camera, used to monitor nuclear plants for any signs of radiation leakage. Boasting a welder on its upper section, the nanobot can autonomously repair any minor leaks it detects to prevent further deterioration.



Figure 3: iCan Nanobot for energy plant monitoring and repair

Advert 3: The Sci-Fi Flying Drone depicted in Figure 4 represents a remote-controlled nanobot designed to cure deafness by facilitating the direct delivery of medication into the patient's inner ear.

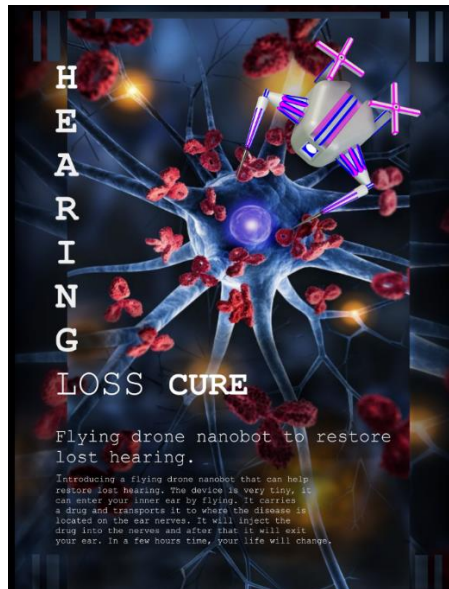


Figure 4: Flying nanobot for healing hearing loss

Dystopian

Speculating a future through a dystopian lens – one pictures a world in such disarray that technology is not used to help bridge inequality gaps but rather exacerbate them.

Advert 4: The nanobot in Figure 5 is a bioweapon used to courier deadly bacteria, such as TB. These Nanobots are almost invisible to the naked eye, so transmission without any detection is almost guaranteed, allowing for targeted infections and even assassinations.

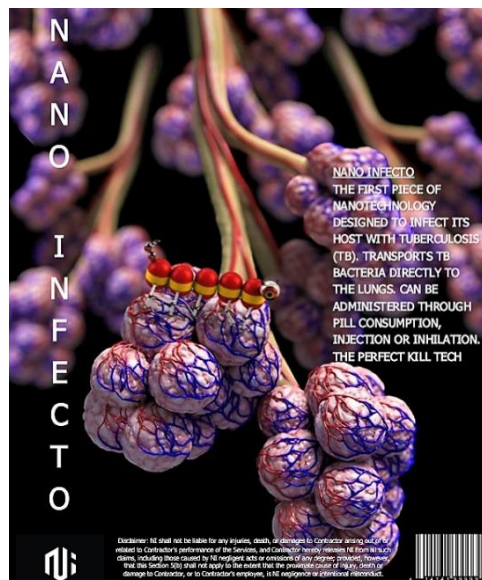


Figure 5: Caterpillar Nanobot for spreading bacterial diseases

Advert 5: The nanobot in Figure 6 is a water-purifying nanobot used to decontaminate water. This student envisioned a nanobot that can be programmed to target specific pollutants in water in a variety of settings, including rivers, lakes, oceans, and even drinking water. While this may at first seem like a utopian example, these nanobots can be programmed to target certain groups of people,

such as dissidents or political enemies, allowing the government to silence dissents and maintain its grip on power. The wealthy and powerful would have access to clean water, while the poor and marginalised would be left to drink dirty water.



Figure 6: Selective water purifying nanobot for rich areas and persons

Advert 6: Finally, The GendAir nanobot in Figure 7 operates based on the principles of Placement Theory, actively assigning and positioning individuals within the constructed gender hierarchy. It goes beyond the surface-level features and delves into the core of one's gender identity and expression, dictating their placement within this oppressive system. By providing pre-set options for physical appearance, it restricts the scope of self-expression and encourages conformity to societal expectations of masculinity and femininity. This reinforcement of gender norms fuels the objectification of both genders and undermines efforts to challenge or dismantle harmful stereotypes.

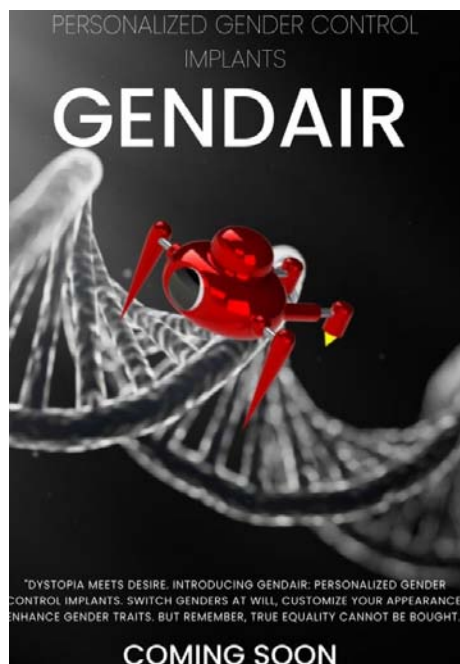


Figure 7: Dystopian eugenics nanobot for selective reproduction

Student reflections

At the end of the project, students were required to complete unstructured written reflections and a semi-structured online questionnaire (Schratz 1992, p. 87). While most students completed the personal reflection essay, it must be noted that only 7 of the 37 students responded to the questionnaire. We therefore acknowledge this limitation when looking at the findings, and therefore want to facilitate a second cycle, to build on these findings and gather more detailed and rigorous feedback.

This questionnaire gathered insights on what the students perceived as their understanding of the different key topics of the project at the beginning and at the end of the project.

Table 1: Summary of student survey questions

General	<ul style="list-style-type: none"> • What about the project did you find successful and useful? • What about the project did you find unsuccessful and ineffective?
Speculative Design	<ul style="list-style-type: none"> • How did you find the speculative nature of the project? • Did you feel the speculative design aspect was relevant and added value to the project?
Technology	<ul style="list-style-type: none"> • Did your views on technology change at all during this project? • In your opinion, is the advancement of technology a positive or negative thing? or both?
Sustainability	<ul style="list-style-type: none"> • Had you heard of the UN SDGs before this project? • Did you learn anything new regarding these goals through the completion of this project? • Did you feel that linking to the SDGs was relevant and added value to the project?
AI Tools	<ul style="list-style-type: none"> • How was your experience using AI generative tools in your ideation phase? <ul style="list-style-type: none"> • Did you find it useful/difficult/boring/exciting? • Would you use AI as an ideation tool again? • Did you feel that using AI added value to the project?

Questions were divided into the four topics/focus areas of the project brief, namely Technology/4IR, Speculative Design methodology, Sustainability, more specifically the SDGs, the use of AI tools. Students were also asked to reflect on what they felt was successful and what was unsuccessful (Table 1). Responses were analysed by the lecturers. Some key findings are presented below:

- Overall, the students found the project to be difficult in terms of them having to learn multiple, complex concepts in a relatively short project.
- Specific ‘successes’ and ‘failures’ spoke to the practical execution of deliverables rather than the brief itself.
- Most respondents felt that the speculative design methodology was confusing (as it falls outside of the traditionally pragmatic discipline) but they also described it as “interesting” and “thought-provoking” and all respondents felt it added value to the project.
- Some respondents did not feel the need to engage with futuristic technologies, such as nanotechnology, as they did not find it relevant to the South African context.
- Most of the respondents did not know about the UN SDGs prior to this project

- All respondents felt that the inclusion of SDGS was relevant as it grounded the project in real-world problems but would have preferred to choose their own SDG of interest.
- Majority of students enjoyed the use of AI and found it to be a useful inspiration/ideation tool. While some voiced their frustration when prompts did not generate the desired outcome.
- Overall, the students thought the inclusion of AI added value to the project.

The project was a success for the students.

I found this project very interesting because of how technology is changing, it made me think/imagine how the future of the world be like and how nanotechnology may affect the world.

The majority of the students were not aware of what sustainable development goals were and their intended purpose in today's world, and how their role as designers fits into the solving or achieving of these goals. For a few students, the project was difficult in terms of them having to learn a lot of these new concepts in such a short project. The project was a success in terms of getting the students to experiment with the AI image generators. However, it is quite evident from the student reflections that some students did not enjoy the project because of the frustrating process of generating the image or scene they had envisioned. Some students also did not feel the need to engage with emerging technologies, such as nanotechnology as it is not relevant to the South African context.

Lecturer observations

This project aimed to assess the effectiveness of incorporating critical design concepts into undergraduate industrial design projects. However, the project's complexity posed challenges for first-year students as it introduced numerous new concepts simultaneously. Additionally, students were required to familiarise themselves with previously unused software. The timing of the project's introduction, in the early second term (March to May), was less than ideal. In order to enhance future iterations, we recommend a staggered approach, allowing students to gradually engage with the theory and become comfortable with the software tools before tackling such a complex project. Analysing project outcomes and student reflections, the authors have noted the below key findings:

1. The lecturers were expecting a lot more enthusiasm from students in terms of using AI generation tools, however, this was not the case. A few students struggled with creating prompts for the AI engines and were frustrated with some of the outputs that they got. Although a few classes and tutorials have been given to students with time being given for experimentation, in future, a more guided one-on-one consultation approach might yield better results.
2. A fear of the lecturers was that students would use these AI image generators too well and heavily rely on them without developing their own creative and critical problem-solving abilities. However, through feedback from the students, they did not view the AI generation tools as a replacement for their ideation process. The images generated are far too literal without context and still rely on the students' own understanding of the application of the product or service.
3. Students need to engage with discourse on SDGs in the early undergraduate years. Although the outcomes may not be resolved or implementable, it gives the students an opportunity to design for a purpose through real-world problem solving.
4. Speculative Design Theory is interesting to students as it gives them the potential to explore their creativity without being constrained to any practicality of use and/or application.
5. The nanobot designs were limited by the CAD abilities of the students. Some good innovative designs were simplified so as to be easily modelled.

As this was an undergraduate first-year project, there was no expectation for the students to fully grasp the key problems they were trying to solve with their nanobots. However, some of the outcomes far exceeded these expectations. The solutions were creative, and the project was fun enough to keep the students engaged through its entirety.

Conclusion

This project served as a starting point to gain insights on how we can further develop our curriculums and pedagogy to answer to the trends and opportunities of the Fourth Industrial Revolution. For students, it also was a reflective creative outlet they used to engage with big-world problems that they did not normally engage with, especially at the first-year undergraduate level. The introduction of higher-level theories is often difficult to integrate seamlessly into teaching and learning in earlier undergraduate years. Students, however, need exposure to such to prepare them for their roles as change-makers in the world. Though the starting point, this paper's research findings and student reflections underscore the transformative potential of integrating speculative design within industrial design pedagogy. This approach encourages students to think beyond immediate constraints and envision possibilities that challenge existing paradigms. By engaging in speculative futures thinking, students develop critical thinking skills, interdisciplinary collaboration, and an awareness of the social, cultural, and environmental contexts in which their designs operate. This prepares them to navigate the ethical considerations and future implications associated with emerging technologies.

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Vulindlela – making new pathways

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Reflecting on lessons-learned for BIM implementation in design curricula in South Africa

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Abstract

In this paper, the authors reflect on the findings from a building information modelling (BIM) literature review, which comprises contemporary literature from the past five years, considering national and international development of BIM implementations, focusing on the architecture, engineering, and construction (AEC) industries. This study acknowledges BIM as a digitalisation breakthrough that emerged in the third industrial revolution (3IR) and evolved rapidly within the Fourth Industrial Revolution (4IR). BIM technology instils the attribute of being a contributive team member in co-designed projects and facilitates effective project outcomes by reducing time, cost, wastage, environmental impact and energy consumption.

The research aims to identify challenges and opportunities that could inform design education teaching and learning strategies in preparing students for a rapidly changing work environment. Most research shows a need for more training (education) and more profound, deeper working knowledge of BIM within the architecture and interior design industry that impacts the implementation thereof. International findings show a need for experienced BIM professionals and personnel globally in the AEC industries. As a response to these needs, educational institutions have developed BIM courses, and researchers have proposed educational frameworks to assist in meeting the needs of the fast-paced development of BIM.

In this paper, the authors explore the South African (SA) architecture and construction industries' BIM implementation and compare the research findings to international studies. The investigation extracts challenges and recommendations relevant to higher education design curriculum. These findings will be discussed in the paper as lessons-learned. These lessons will be discussed and developed in recommendations that could assist in identifying new pathways in future-forward, industry-relevant architecture and interior design curricula. Recommendations explain that a BIM curriculum is a holistic process that should include role players in curricula development to ensure an alignment with industry expectations. Successful BIM programmes include cross-disciplinary collaborations in which students can work as team members in co-design projects.

Keywords: Building information modelling (BIM), BIM implementation, BIM curriculum.

Introduction

BIM technology has been available for a considerable time, but adopting the BIM methodology in the built environment industries has been slow (Besné et al. 2021, p. 1). Internationally, uptake of the method is observed in the construction industries of the United States of America, United Kingdom, Canada and France due to governmental requirements, initiatives and research driving the change. The introduction of BIM in these industries has led to employment opportunities and the need for experts in this methodology (Besné et al. 2021, p. 2).

Even though BIM technology and the BIM methodology are evident in some of the AEC industries, BIM has yet to be similarly adopted in AEC-related curricula in higher education (HE) as a pedagogical method (Hu 2019, p. 1). Producing graduates with the necessary competencies requires HE to provide students with the essential knowledge and skills to meet and exceed the expectations of the industries they enter. Including the BIM methodology within the curricula can strengthen the link between academic activities and the industry's requirements.

Besné et al. (2021, p. 2) explain that incorporating BIM in AEC curricula should not change this objective but rather "change the teaching/learning methodology". Active engagement with BIM constitutes a new methodology and not only the introduction of new technology. This process emphasises the moves away from traditional drafting-based modelling (Hu 2019, p. 1). The trajectory towards BIM is more than just technological adoption and requires a cultural change in rethinking processes (Salgado 2022, p. 1). BIM has engaged a paradigm shift from conventional drawing practice to digital modelling, which requires the engagement of abstractions and model development processes.

This paper, therefore, aims to understand BIM implementation in SA by asking the following questions: (a) what are the challenges associated with BIM implementation? (b) how are these challenges addressed in the industry? (c) how can these challenges be addressed in higher education to improve students' entry into a fast-paced, technology-driven work environment? These questions will be explored by conducting a literature review to understand BIM development, implementation models, the 'BIM-gap', integration in the architecture and construction industries and HE, the implementation rate, associated challenges and obstacles.

A literature review is considered appropriate since the body of knowledge associated with implementing BIM in SA has increased significantly over the last five years through research output and postgraduate studies in the Engineering and Built Environment faculties at leading research universities such as the University of Johannesburg, University of Stellenbosch, University of Cape Town and the University of Witwatersrand. Through gaining knowledge and understanding of the challenges documented in BIM implementation in SA, the authors will extract findings presented as lessons-learned and guide recommendations for considering BIM implementation into architecture and interior design curricula.

Building information modelling (BIM) methodology and processes

The development of building design software initiated the conceptualisation of computer modelling for buildings (Sacks et al. 2018, p. 367). Eastman is considered one of the pioneers of the BIM concept, which dates back to the 1970s when he proposed the then Building Description System (BDS), which aimed to integrate information technology and building design (Eastman 1976, p. 17). At the time, Eastman described the BDS as having the potential to reduce the cost associated with preparing construction documents and facilitating quantitative analyses. It was also proposed that the design

development be better coordinated and allow contractors to receive information for ordering and schedules automatically beyond the design phase. Implementing this approach relied on information management, which required large databases that supported "high rates of information transfer" (Eastman 1976, p. 25).

BIM can also be categorised according to its maturity levels¹ (presented in Figure 1), which refer to the application of information technology and reflects a collaborative process and a sophistication of engagement with various digital tools or BIM platforms (Sacks et al. 2018, pp. 15-16). BIM aims to progress operations amongst the built-environment-associated industries from Level 0, a paper-centric process, toward BIM Level 3, which sees discipline integration and interoperable workflow, streamlining coordinated and collaborative processes. This is achievable by leveraging computing abilities, web communication, and data collection for information management. BIM-enabled design processes allow for informed decision-making based on tangible evidence throughout the lifecycle of a building because BIM comprises intelligent 3D models that use parametric building components that mimic real-life scenarios (Maina 2018, p. 168).

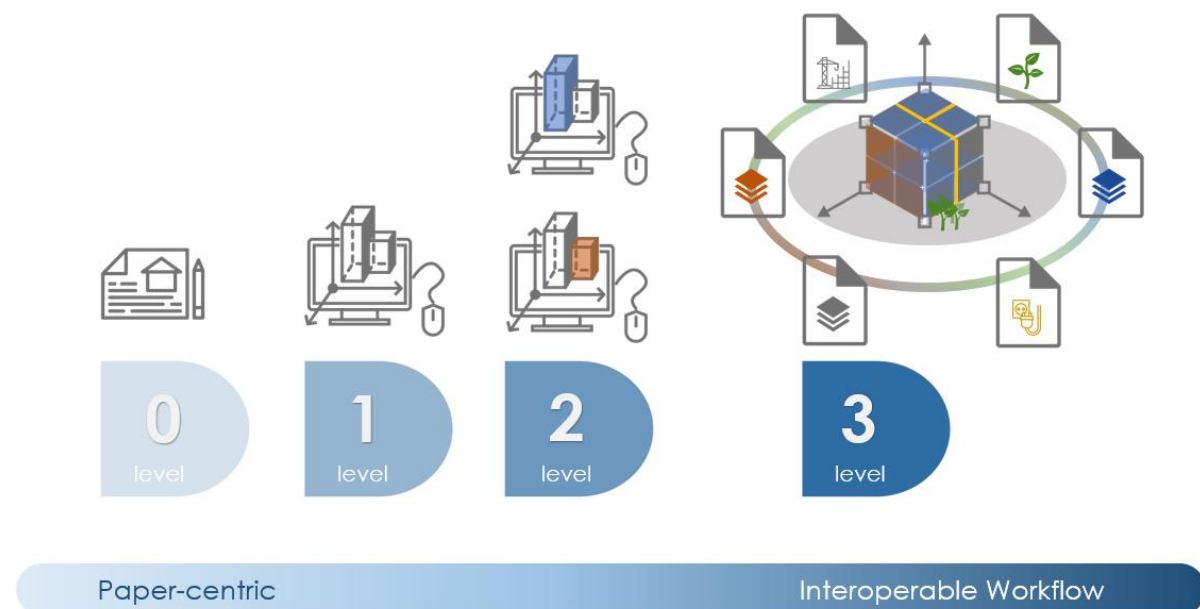


Figure 1: BIM maturity levels, by authors 2023

Many software tools are available to support the BIM concept and activities associated with various disciplines. These tools work alongside the BIM model to support information analyses and provide additional data layers that refer to BIM dimensions. By linking additional data dimensions to building models, the management of building occupancy for maintenance, replacement, and repair can occur beyond construction processes and project delivery. These BIM dimensions can be classified according to 3D to 7D and beyond, i.e., nD, and impact BIM maturity. These BIM dimensions are described by

¹ BIM maturity levels as described by Sacks et al.(2018:15-16):

Level 0 BIM: Information is available in a 2D format typical of traditional paper drawings.

Level 1 BIM: A mixture of 3D CAD conceptual work and 2D drafting. Digital models are not shared among team members.

Level 2 BIM: Distinguished through collaborative working. All parties work on a 3D model separately, not on a shared model. Information is shared via a common file format, allowing anyone to merge their information with the file they receive.

Level 3 BIM: Collaboration amongst all participating disciplines using a single share project model that is centrally held, for example, in the cloud. The benefit is that it removes the risk of conflicting information.

Maina (2018, p. 169) as the autonomous 3D model (3D), the addition of time for the purpose of project scheduling and managing construction processes (4D), incorporation of cost estimation to allow for budgeting and financial planning (5D), the introduction of sustainability taking into consideration aspects like energy consumption projections (6D), and operational management throughout the life cycle of the building (7D).

As described by Maina, these dimensions are typically focused on the inanimate building. However, researchers like Salehabadi and Ruparathna (2022, p. 11, 13) are critiquing this approach as it does not necessarily track the comprehensive human impact of a building's users throughout its lifecycle. In response, they developed a BIM-based sustainability assessment, which could inform occupants to monitor their impact on a building. This demonstrates that BIM technology in building design is rapidly expanding into sustainable building design and life cycle assessment processes (Salehabadi & Ruparathna 2022, p 13). In addition, we observe that it also demonstrates that BIM supports not only industry professionals but also the public, where users can mindfully engage with the building they inhabit and engage with data concerning sustainability factors, namely, environmental, social, economic, and resiliency aspects.

BIM technologies advanced from merely being a concept to a viable commercial solution around 2000 (Sacks et al. 2018, p. 370). The transition to BIM is "not a natural progression" from computer-aided drafting (CAD). CAD describes the digitising of the conventional drafting process by hand. The trajectory towards BIM is more than just technological adoption and requires a cultural change in rethinking processes (Salgado 2022, p. 1). BIM requires a paradigm shift away from conventional drawing practice to modelling, which requires the engagement of model development processes and abstractions. This can lead to new design processes and building methods. The need for improved collaboration further facilitates this shift across design, construction and facility management processes (Sacks et al. 2018, p. 370).

Traditional and familiar project development processes typically see project members engaging in varying and non-integrated work methodologies due to a lack of a central base of complete and updated information to access, which sees a loss of valuable information through the various stages of the project (Sampaio 2018, p. 18) – a classic case of the 'broken telephone'. The BIM methodology supported by an "information-rich 3D model" is changing the way in which information is managed (Sampaio 2018, p. 20). This integration makes the process more accessible for all parties involved and tracks all aspects throughout the building's life cycle.

BIM-associated technological tools, software and plugins make this approach possible and allow various disciplines to engage in an integrated virtual environment (Sampaio 2018, p. 21). The virtual environment refers to the central base or platform hosted in the cloud. Depending on the BIM platform where the model is hosted, interaction can occur with other BIM professionals not part of your existing or known network of disciplines. This allows discovering other professionals who could join the team to solve and support a project-specific requirement.

BIM and a case for education

Pillay, Gumbo, and Musonda (2019, p. 838) identified that although BIM has been implemented over a short period of time in architectural firms across the globe, in SA, it is limitedly adopted in the curricula. This results in producing graduates entering the industry with poor BIM skill sets and a lack of understanding of BIM (Calitz & Wium 2022, p. 33). A far greater concern is that the slow uptake threatens the SA construction industry's competitiveness and presents opportunities for international companies to perform the work (Calitz & Wium 2022, p. 32). Various barriers contribute to the slow

uptake of BIM technology in education and include the complexity of software, available equipment, lecturers' knowledge and training, and time (Pillay, Gumbo & Musonda 2019, p. 838; Calitz & Wium 2022, p. 34). However, education is identified as one of the four main industry role-players who can assist in accelerating BIM implementation in South Africa. The four main stakeholders are listed as "government, the education sector, private organisations, and software developers" (Calitz & Wium 2022, p. 34). The role and responsibility identified for the education sector extend beyond training students and upskilling professionals and should include producing research on BIM to understand the impact and skill sets required in the industry.

Internationally, a change is observed in the education environment, which sees a technological movement aiming to eradicate the barriers to information flow typically created by humanity (Besné et al. 2021, p. 3). Similarly, Hu (2019, p. 2) documents a shift in education which actively engages cross-disciplinary collaboration for BIM implementation. Industries emphasise the importance of BIM concepts, collaborative implementation processes, and skills in BIM tools as critical and complementary and should be actively embraced in curricula (Hu 2019, p. 8). Besné et al. (2021, p. 2) reflect on previous publications, which concur that for someone to engage in collaborative work in a professional setting, that person must have been educated in a collaborative manner, bringing them closer to practice. Adopting BIM and its associated complexities necessitates radical changes in the education environment for effective implementation.

The objective of BIM implementation in the curricula should be to leverage technology for improved processes and not just mastery of the software. This necessitates changing the teaching and learning methodology rather than the curriculum content (Besné et al. 2021, p. 2). BIM should not be misconstrued as merely a 3D modelling software program and reduced to the know-how of operating various software. Some of the software is often also used only for visualisations, and the digital 3D model does not provide any intelligent information at the object level and, therefore, does not support data integration or assist with design analyses (Sacks et al. 2018, p. 20). This approach negates its potential beyond modelling for project management and collaboration processes (Huang 2018, p. 404).

Lessons-learned from research in the industry

BIM implementation is perceived as expensive

BIM implementation has accelerated and shown a spike in implementation in the United States, United Kingdom, Australia, China and Singapore over the last 15 years (Chen, Lu & Wang 2020, p. 401). However, BIM implementation is lower in developing countries (Olugboyega, Windapo, Aigbavboa & Oseghale 2023, p. 3). Calitz and Wium (2022, p. 33) identified the expensive BIM software license as a constraint to BIM implementation in South Africa. From a financial perspective, BIM's biggest challenge is that it is perceived as expensive and increases financial risks when engaging in training, upskilling, and purchasing computer hardware and software.

BIM implementation requires BIM training and staff development

Effective and efficient implementation of BIM in an architectural firm requires staff training and upskilling. Professional BIM training programmes, offered by industry practitioners who are experienced in the software and have hands-on knowledge and experience, can assist in managing the technology change and successful implementation (Chen, Lu & Wang 2020, p. 402).

BIM commitment and support from key role-players and top management

The successful implementation of BIM requires committed key stakeholders who take accountability for facilitating the process. The key role-players in South Africa are the government, the education sector, private organisations, and software developers (Calitz & Wium 2022, p. 34). In this group of role-players, private organisations face the most difficult task. The implementation requires financial risk in introducing new software and work processes, as well as upskilling of professions and staff development, which impact project execution time, effectiveness, and efficiency. Therefore, architectural or engineering firms will prefer candidates with high BIM skill levels who can immediately deliver and contribute to the work process without additional training (Pillay, Gumbo & Musonda 2019, p. 837).

Top management, or the organisation's leadership, determines the project and company commitment towards BIM implementation. Olugboyega, Windapo, Aigbavboa and Oseghale (2023, p. 4) argue that "the management of construction organisations must commit to the BIM adoption path". These authors further explain that a project-committed management team will take accountability for managing the transition, change, and competence required for BIM implementation. Their research findings also show that construction companies are embedding BIM adoption in their organisations' vision and strategies and setting BIM competency and "new values for their employees" (Olugboyega, Windapo, Aigbavboa & Oseghale 2023, p. 9). If BIM adoption is present in an organisation's vision, it will positively impact the company culture to embrace change and employees' commitment to embrace new learning or be dedicated to the BIM training process.

Resistance to technological change and working in silos

Familiarity with technology and executing tasks, projects and processes in a certain manner is preferred in fast-paced architecture and construction environments. Calitz and Wium (2022, p. 33) identify that resistance to change procedures and collaboration between project stakeholders is a common challenge in the South African construction industry. The established cultural norm is to work in silos and perform tasks within well-known and accepted processes, requiring minimum upskilling or project process negotiation. This challenge is detrimental to the successful implementation of BIM technology. Increased awareness of BIM technology is required to understand the business value, incorporate implementation strategies, and include stakeholder workshops, which could benefit a shared understanding.

Recommendations for the architecture and interior design curricula

In this paper, several challenges and hurdles are identified that impact the revision of architecture and design curricula when implementing BIM technology and processes. The following recommendations were developed from the *lessons-learned* presented in this paper:

The education sector can accelerate the BIM learning curve in SA

A spike in adopting BIM technology is evident globally; however, a far slower pace of BIM implementation is evident in SA. This challenge could be addressed by implementing various curriculum options in higher education and training facilities. Calitz and Wium (2022, p. 34) identify the higher education sector as one of four key role players in developing BIM implementations. The role players cannot operate in isolation, and involving all the role players in the development of curricula could assist in aligning outcomes with industry expectations and increase the successful BIM implementation across all sectors. In addition to meeting industry expectations, education can inject

the industry with highly skilled BIM graduates to accelerate the industry's BIM implementation processes and set the pace for renewed, future-focused working methodologies.

Consider various programme options and structures

A BIM programme could range from a series of short learning programmes that address specific theoretical or practical focus areas to a comprehensive inclusion where it is integrated into the major modules of design programmes, such as interior design and architecture. In these modules, vertical articulation between study years could assist in deepening the students' BIM knowledge and mastering the methodology whilst integrating the various building activities into a project solution.

Successful BIM programmes include cross-disciplinary collaborations

The development of BIM curricula requires teaching and learning strategies that are developed across disciplines. BIM training must prepare students for cross-disciplinary industry interaction. In South Africa, interior design programmes are often seen as an outlier to the construction industry, whilst the discipline is well integrated into international BIM projects. Design faculties should include a range of design disciplines that can prepare a student for the complex BIM system that considers expert opinion across various disciplines to contribute to the project design. The student should become familiar with being a team member who co-designs projects with fellow designers. Projects should be designed to simulate a multidisciplinary and interactive experience for students.

BIM is not a CAD software programme

CAD drawings initially replaced the technical drawings produced through hand drawings on drawing boards, with adjustments to 3D CAD programs in the 1980s. As discussed in this paper, BIM requires a paradigm shift from conventional drawing practice to modelling, which requires the engagement of abstractions and model development processes. Embracing this process will enable students to explore new design processes and building methods. BIM is not merely a 3D modelling software program but a platform that allows intelligent information integration, which assists with design analyses and informed decision-making.

Lecturers need to be competent in BIM training

A challenge identified in implementing BIM curricula is that academics have strong theoretical disciplinary knowledge and are not trained in BIM processes and methodologies (Chen, Lu & Wang 2020, p. 402). It is recommended that experienced BIM instructors or facilitators with appropriate training be included in developing a BIM curriculum and offering programmes to develop appropriate BIM-relevant design projects and job-ready graduates.

Implementing BIM requires a project-committed management team

Olugboyega, Windapo, Aigbavboa and Oseghale (2023, p. 4) explain that a project-committed management team will take accountability for managing the transition, change and competence required for BIM implementation. Successful integration in higher education will require the support of faculty and institutional management to ensure the availability of appropriate funding and resources. A holistic integration into a broader teaching philosophy will assist in a dedicated project implementation. The project team should include programme facilitators well-connected with the industry and within the institution to remove isolated or "silo" thinking and development in the faculties.

Conclusion

In this paper, challenges associated with BIM implementation and how these challenges relate to the South African architecture and construction industry are discussed. The major challenges were identified as the high cost of the software, which impacts slow implementation in SA; skilled and experienced operators are required for the training; financial risk in incorporating new technology and processes; and resistance to change in a fast-paced industry who works efficiently with known technology and who are executing tasks, projects and processes in a familiar manner.

Through the literature review, the authors identified the education sector's role as one of four key stakeholders that can deliver significant contributions to BIM implementation in South Africa. The lessons-learned from the literature identified the following findings: the education sector is an essential role-player in implementing BIM in SA; various curriculum modules could be considered for introduction into HE; BIM allows for intelligent information integration and is not merely a CAD software program; experienced BIM instructors or facilitators are required for successful implementation and due to the high cost and paradigm shift required, BIM implementation requires a project-committed management team.

The research shows that the design education sector can assist in accelerating BIM education and inject the industry with high-level skilled BIM graduates to accelerate the industry's BIM processes and set the pace for renewed, future-focused working methodologies.

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Vulindlela – making new pathways

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The digital supervisor: Key to access or shortcutting research?

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Abstract

Postgraduate students in South Africa and other developing nations face substantial hurdles in completing their research, despite efforts to boost research output and garner subsidies from the Department of Higher Education and Training (DHET). Key issues include research capacity development and supervision burdens. The potential of conversational AIs, like ChatGPT, as research assistants, has been discussed, but more research needs to be focused on using ChatGPT to support novice and student researchers, especially within resource-poor Global South contexts. Large language models (LLMs) such as ChatGPT can support the scientific research process, assisting in generating research questions, developing methodology, creating experiments, analysing data, and writing manuscripts. Responsible use of LLMs in research is crucial, underscoring the need to balance LLM benefits and limitations, retain essential academic skills, and ensure research equity. Our study on ChatGPT's role in postgraduate education offers insights into these areas.

We use a Case study approach at a university of technology in South Africa. The research has two main objectives: firstly, it presents a survey examining current ChatGPT usage among postgraduate students, exploring frequency and common applications, and assessing perceived utility in research work. Secondly, it analyses a Design student's experience using ChatGPT to transform initial ideas into a research proposal to understand its potential and constraints as a 'digital supervisor'.

Findings underscore the potential of AI tools to boost academic productivity and streamline the research process. It also outlines limitations of AI tools, such as accuracy, potential over-reliance, and creativity concerns. The study highlights the necessity of a balanced pedagogical approach, integrating AI and traditional methods, and promoting ethical AI usage. It underscores challenges in AI tool deployment, like access issues and language barriers, particularly in the South African context.

A significant finding is the potential role of AI tools like ChatGPT as digital supervisors, alleviating the burden on human supervisors and strengthening postgraduate culture in design. The study warns against viewing AI tools as complete substitutes for human supervisors and emphasises students' comprehension of AI functions and ethical implications.

The research contributes to design education by demonstrating the potential benefits and limitations of using LLMs as 'digital supervisors' to enhance access to postgraduate studies, particularly in the Global South. It emphasises the importance of incorporating LLMs into student learning and research in design responsibly, ensuring students develop requisite research skills and knowledge. Finally, we

ask what the implications might be for the field of design is whether there is a need to cultivate our own Design AIs.

Keywords: Design education, digital supervision, large language models, postgraduate research.

Introduction

Facing challenges such as high attrition rates, limited supervisory capacity, and student underpreparedness in postgraduate education, South Africa is in urgent need of innovative solutions (Akala 2021, p. 3; Dlamini 2020, p. 111; Mouton 2016, p. 16218; Sonn 2016, p. 234). In this context, the OpenAI-Developed Language Model, ChatGPT,¹ shows promise with its demonstrated applications in education, including academic writing assistance, research support, and language learning (Baidoo-Anu & Owusu Ansah 2023; Halaweh 2023; Kasneci et al. 2023; Kooli 2023; Yan et al. 2023), which align with the needs of South African postgraduate students and supervisors. Despite the potential benefits such as personalised learning experiences and quick access to relevant information, the use of ChatGPT raises concerns, including potential academic dishonesty, privacy issues, and lack of human creativity in outputs, emphasising the need for careful management and regulation in its application in postgraduate education (Baidoo-Anu & Owusu Ansah 2023; Khalil & Er 2023; Perkins 2023; Rahman & Watanobe 2023).

Even though there is a growing body of literature on the use of ChatGPT in research contexts, there is a gap in the research on the use of the technology by students in higher education (Strzelecki 2023). More research needs to be focused on using ChatGPT to support novice and student researchers, especially within resource-poor Global South contexts.

The study contributes to the field of design education by demonstrating the potential benefits and limitations of using conversational Large Language models (LLM) like ChatGPT as ‘digital supervisors’ to increase access to postgraduate studies in a Global South context. By surveying postgraduate students, the study gauges the extent to which students already use ChatGPT in their research activities. It raises important questions about how LLMs can be incorporated into student learning and research qualifications in design, whilst ensuring that students develop the skills and knowledge necessary to engage in research efficiently and ethically. In the conclusion, we consider pertinent questions relevant to the field of design education.

Defining the South African postgraduate education landscape

Since the landmark year of 1994,² South Africa's higher education sector has experienced profound shifts, marked by a significant expansion in postgraduate degrees and an intentional drive to prioritise postgraduate education at the national level (Akala 2021, p. 2; Dominguez-Whitehead 2015, p. 914). This development, spurred by the National Research Foundation (NRF) Funding Framework and governmental mandates, has resulted in a consistent increase in doctoral graduates. The National Plan for Higher Education and the Department of Higher Education and Training (DHET) aim to increase the staff with doctoral degrees from 34% to 75% by 2030 (Mphekgwana, Mabila, Tirivangasi & Makgopa 2020; Manyike 2017). However, these positive strides coexist with the challenge of an expanded

¹ ChatGPT is a large language model developed by OpenAI and designed to function as a conversational agent. It utilises a transformer architecture and has been trained on a vast amount of internet text to generate human-like text responses in conversation settings (Rudolph et al 2023, p. 344).

² South Africa held its first democratic elections in 1994, marking the end of apartheid policies.

workload for supervisors and the pressure to accelerate the production of high-quality graduates (Akala 2021, p. 3–4). Yet, the attrition rates remain a concern, with South African higher education institutions recording some of the highest globally (Dominguez-Whitehead 2015, p. 914–915). Additionally, the transition from undergraduate to postgraduate studies introduces new hurdles, such as low progression rates and a high ratio of part-time doctoral students (Mphekgwana et al. 2020). Therefore, a considered approach is essential for preparing undergraduates for postgraduate studies (Sonn 2016; Dominguez-Whitehead 2015, p. 914–915).

Addressing challenges in postgraduate growth through applications of ChatGPT

South Africa has made commendable strides in boosting postgraduate student numbers, yet substantial challenges linger. These hurdles include high attrition rates, limited supervisor capacity, and the necessity for a smoother undergraduate-to-postgraduate transition, all of which are crucial for achieving the government's ambitious targets and fortifying South Africa's global competitiveness (Akala 2021; Mouton 2016; Dlamini 2020; Sonn 2016).

The surge in postgraduate student numbers has amplified the strain on supervisors, who now face a significantly higher student-supervisor ratio (Akala 2021). The evolving nature of academic work and an increase in administrative responsibilities further dilute the time available for quality supervision (Akala 2021). Supervisors are also often required to guide students beyond their primary expertise areas, posing additional challenges (Mouton 2016). Faced with these challenges, innovative solutions are required to bridge supervision challenges and support the postgraduate journey effectively. One potential avenue could lie in harnessing the capabilities of emerging technologies like ChatGPT.

ChatGPT and similar technologies offer a range of educational applications, though not without ethical and practical issues. Particularly in writing support, ChatGPT provides assistance with phrasing, tone, style (Kooli 2023), grammatical feedback for language learners and non-native English speakers (Rahman & Watanobe 2023; Sullivan, Kelly & McLaughlan 2023), and help in interpreting complex terms and task structuring (Sullivan et al. 2023).

Content generation is another area where ChatGPT has shown potential, with its abilities ranging from creating code snippets, executing complex mathematical operations, and generating various forms of textual content (Khalil & Er 2023). This includes essays (Khalil & Er 2023; Raman et al. 2023), stories, plays, poems (Raman et al. 2023), and detailed responses to questions (Rospigliosi 2023). As a research tool, ChatGPT's applications are seen in fact-checking (Kooli 2023) and data retrieval (Alshurafat 2023), along with the automation of repetitive tasks like data entry (Kooli 2023). Its value in learning support is notable, aiding in decoding complex concepts (Rahman & Watanobe 2023) and supporting diverse student needs (Sullivan et al. 2023), even contributing to test preparation.

Challenges of integrating AI in postgraduate settings

The widespread application and integration of artificial intelligence (AI) in educational systems, particularly through tools like ChatGPT, has triggered a substantial body of literature discussing potential limitations and ethical concerns. A recurring concern in studies (Khalil & Er 2023; Rahman & Watanobe 2023; Raman et al. 2023) revolves around academic dishonesty risks, particularly plagiarism, as students may exploit AI for content creation. This may have broader implications for academic integrity and raise questions about the reliability of plagiarism-check software used by academic institutions. The quality and accuracy of AI-generated content are also contentious (Shoufan 2023; Peres et al. 2023; Rahman & Watanobe 2023), with identified limitations such as producing false

text (Peres, Schreier, Schweidel & Sorescu 2023; Shoufan 2023) and difficulty in completing complex reasoning (Rahman & Watanobe 2023).

Furthermore, the literature underscores concern around data privacy and security (Kooli 2023; Rahman & Watanobe 2023; Yan et al. 2023), recommending institutional measures for transparency, accountability, and user data control. A major ethical concern is the potential for AI to propagate bias. Raman et al. (2023) pointed to gender bias, arguing that ChatGPT exhibited a bias towards male users, while Rahman and Watanobe (2023) warned of the potential for ChatGPT to generate harmful content, including fake news and hate speech. Another concern is that of accountability and transparency in AI's internal mechanisms and processes (2023). This lack of transparency makes it difficult to hold anyone accountable for the responses generated by the AI, further exacerbating ethical concerns.

Despite the extensive literature on the limitations and ethical concerns of AI technologies in education, some topics appear to be underrepresented. For instance, while data privacy is a commonly expressed concern, discussions on detailed strategies for enforcing data protection and privacy measures in the practical application of AI in education remain scarce. The literature seldom discusses how these technologies might impact pedagogy or affect teacher-student relationships. Moreover, the conversation around how AI can be used responsibly and ethically to support learning while preventing misuse appears to be limited. More discourse is also needed on the social implications of AI integration, particularly in terms of equity and access in education. Sullivan et al. (2023) highlighted this concern, indicating a lack of public discussion about how ChatGPT might enhance participation and success for students from disadvantaged backgrounds. Future research needs to examine these understudied areas to fully understand and navigate the complexities associated with AI applications in education.

While AI technologies like ChatGPT offer immense potential for revolutionising education and research, their use must be tempered with an understanding of their limitations and a cautious approach to their ethical implications. It is imperative for future research to address these concerns and develop strategies to integrate these technologies into the educational landscape effectively.

Research methods

This study uses a case study approach, focusing on a university of technology situated in South Africa. The primary objectives of the study are twofold: Firstly, to analyse the current usage patterns of ChatGPT among postgraduate students through a structured survey questionnaire. Secondly, to provide an in-depth evaluation of ChatGPT's potential as a 'digital supervisor' by analysing the user experience of a Design student researcher.

The first phase of the research entailed the use of a structured questionnaire. This resulted in 35 valid responses. These participants, currently enrolled or intending to enrol in a postgraduate qualification at the aforementioned university, were selected to provide a broad and diverse understanding of the usage of ChatGPT. The age distribution of the participants varied widely (Table 1), with the largest group being between the ages of 25 and 34. With respect to gender, there were 18 male participants, 16 female participants, and one non-binary participant.

Table 1: Age ranges of survey respondents

Age range	Responses by age
25 - 34	11
35 - 44	8
Above 55	6
18 - 24	5
45 - 54	5

The educational backgrounds of the participants were diverse as well, comprising nine doctorate/doctoral students, 13 individuals enrolled in a master's degree, and 13 postgraduate diploma/certificate students. Additionally, the participants represented various departments, with Applied Design being the most represented, followed by Electrical Engineering and Information Technology. The breakdown of these departments is illustrated in Figure 1.

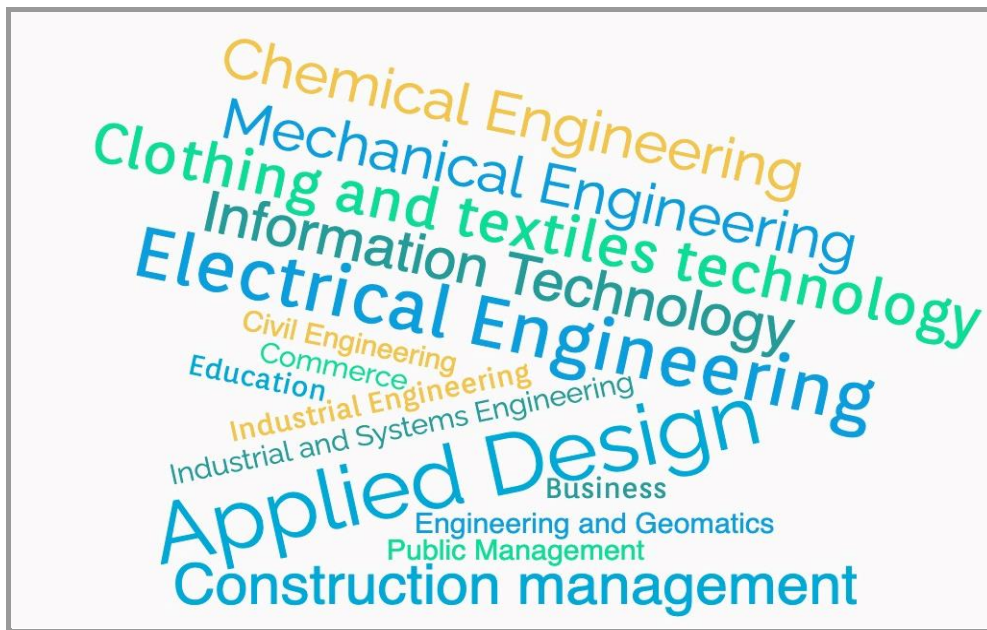


Figure 1: Word cloud visualisation of departmental distribution among survey respondents

In the second phase of the study, a more detailed examination of the use of ChatGPT was undertaken. Specifically, we studied the usage of ChatGPT by a Design student researcher (also a co-author of this paper) in the process of organising initial ideas into a research proposal. The goal was to gather insights into the potential benefits and constraints of employing ChatGPT as a 'digital supervisor'. The study analysed the prompts given to ChatGPT, as well as the satisfaction levels with the responses provided by the AI.

Survey findings

Results indicating the most beneficial application of ChatGPT in research tasks

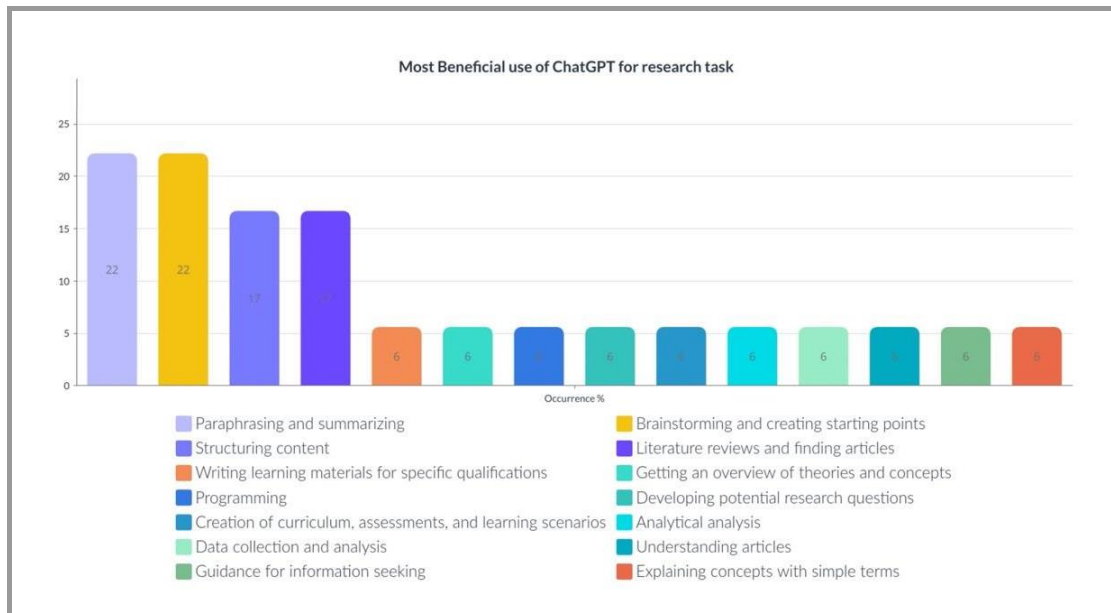


Figure 2: The most beneficial application of ChatGPT in research tasks

Figure 2 illustrates the percentage response rate per category and offers insights into ChatGPT's usage in research, with the most common being paraphrasing and summarising information (22.2% of respondents³). 22.2% of respondents⁴ used ChatGPT for brainstorming and creating starting points in the early research stages. Additionally, 16.7% of respondents⁵ found it helpful in structuring content. 16.7% of participants⁶ used it for literature review and finding articles. Unique use-cases included programming (P12), creating learning materials (P6), developing research questions (P15), providing explanations (P43), and illustrating its diverse range of applications. Some respondents found it useful for understanding articles (P32), data collection and analysis (P30), and information seeking (P33).

³ Respondents P4, P24, P25 and P33.

⁴ Respondents P7, P15, P30, P33.

⁵ Respondents P20, P7 and P16.

⁶ Respondents P9, P41 and P42.

Results indicating the overall benefits of using ChatGPT for research purposes

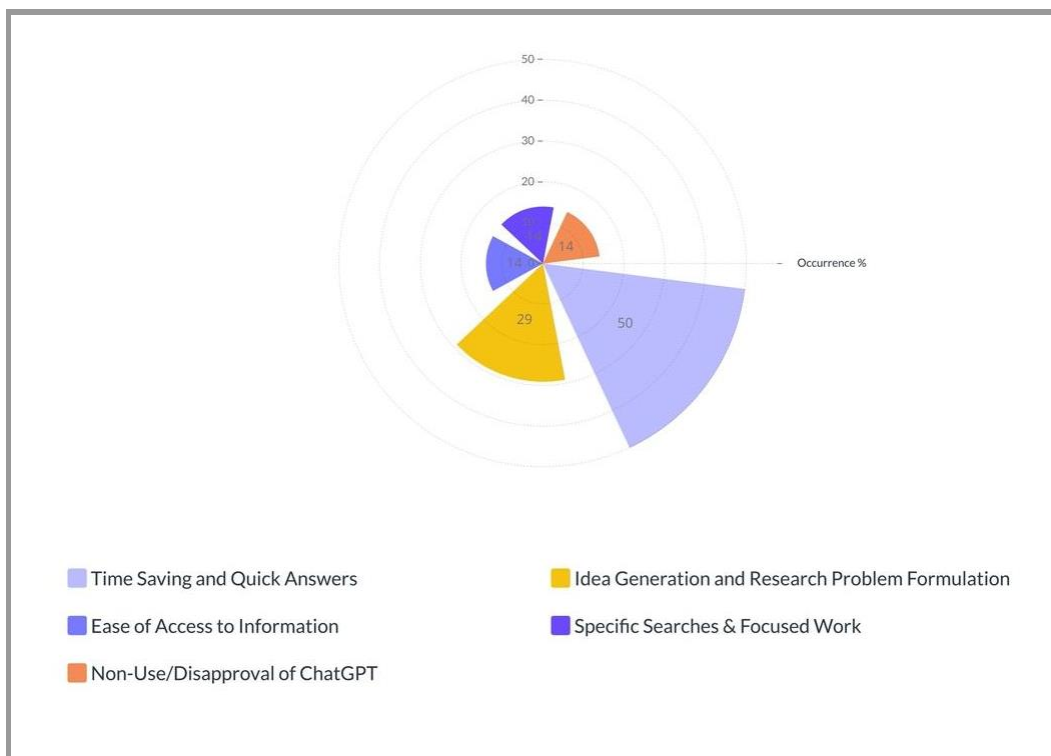


Figure 3: The main benefits of using ChatGPT

A thematic analysis of responses revealed key areas in which respondents found ChatGPT valuable for research purposes (Figure 3). Four themes indicating benefits were identified, with a fifth theme indicating non-use or disapproval. The predominant theme identified was the role of ChatGPT in Time Saving and Quick Answers. Nearly half the respondents⁷ emphasised ChatGPT's ability to rapidly generate ideas and provide quick initial frameworks, saving time.

Idea generation and research problem formulation was also a common theme. Participants noted⁸ ChatGPT's capacity for supporting new idea formulation and aiding in literature presentation, with P15 highlighting its usefulness in question development for research problems.

Ease of access to Information was underscored by respondents,⁹ as ChatGPT offers a convenient gateway to relevant information. Additionally, a few participants¹⁰ lauded ChatGPT for enabling *specific searches & focused work*, helping them maintain focus and conduct targeted searches.

⁷ Respondents P4, P8, P9, P20, P30, P33 and P12.

⁸ Respondents P16, P25, P41 and P15.

⁹ Respondents P29 and P33.

¹⁰ Respondents P7 and P42.

Results indicating the limitations of ChatGPT

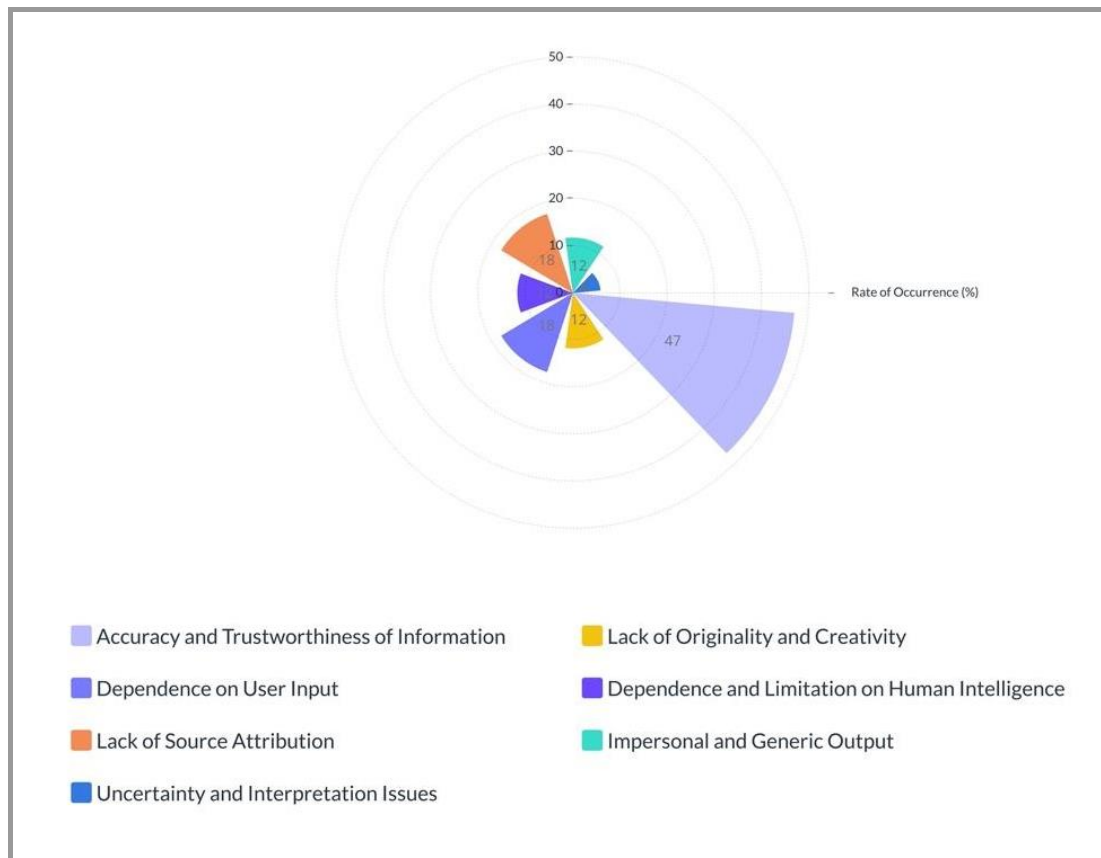


Figure 4: The limitations of using ChatGPT

Participants' concerns about limitations of ChatGPT were distilled into seven key themes (Figure 4). Nearly half (47.06%) flagged the *accuracy and trustworthiness of information*, doubting the reliability of the AI's output.¹¹ The *dependence on user input* was noted by 17.65% of respondents,¹² emphasising that the output quality is tied to the input's clarity and quality. Participants criticised the *lack of originality and creativity* (11.76%), with P7 noting ChatGPT's output often represents a simple regurgitation of information. Also, concerns about *dependence and limitation on human intelligence* emerged (11.76%), with participants¹³ worrying that overuse might diminish independent thinking abilities. The *lack of source attribution* was an issue for 17.65% of participants,¹⁴ and *impersonal and generic output* was another concern.¹⁵ Minor themes included *Uncertainty and Interpretation Issues* (5.88%, P29) and questions about *credibility and authenticity of work* (5.88%, P24). These insights reveal significant considerations that users have about the usage of AI tools like ChatGPT.

¹¹ Respondents P4, P6 and P20.

¹² Respondents P7 and P25.

¹³ Respondents P32 and P41.

¹⁴ Respondents P16 and P33.

¹⁵ 11.76% of respondents, P15.

Results indicating barriers when using ChatGPT

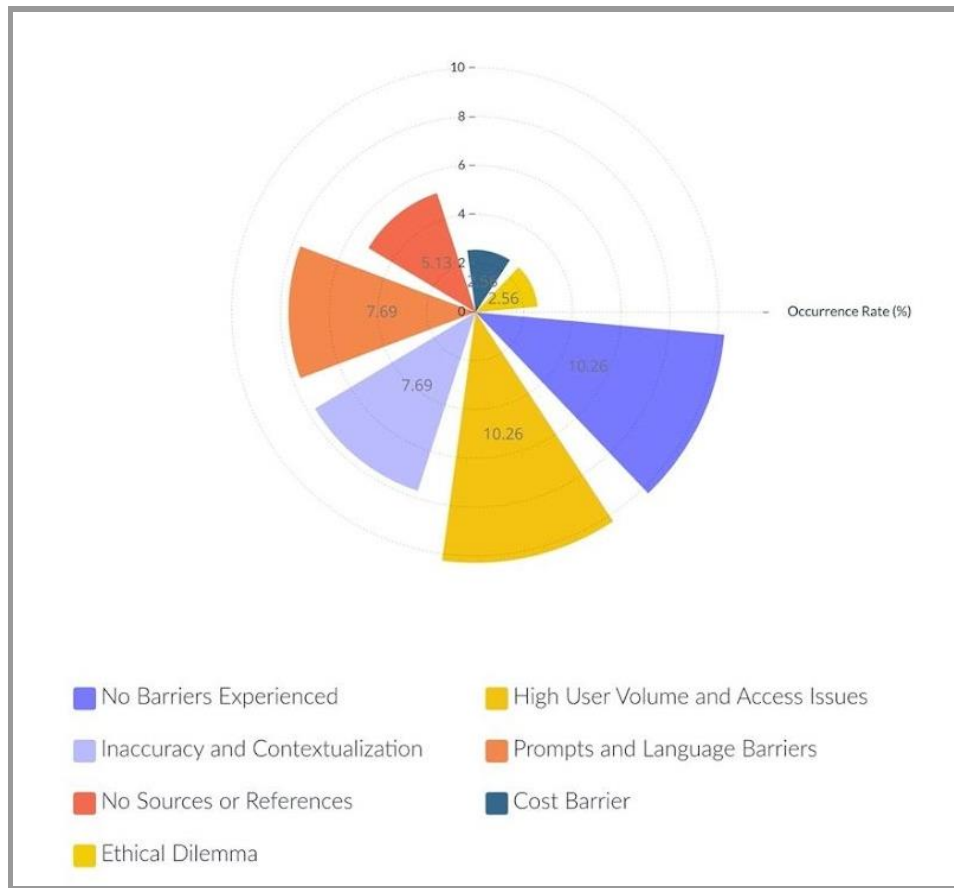


Figure 5: The barriers experienced when using ChatGPT

The dataset illuminated barriers to using ChatGPT (Figure 5). While many participants¹⁶ reported *no barriers experienced*, suggesting a generally positive user experience, several challenges were identified. These included *high user volume and access issues*,¹⁷ potentially resulting from the tool's popularity, and *inaccuracy and contextualisation* issues,¹⁸ indicating room for improvement in response accuracy and contextual relevance. Non-native English speakers pointed out *prompts and language barriers*,¹⁹ emphasising the need for language diversity support. *Cost barrier* was also mentioned as a concern.²⁰ Finally, the *ethical dilemma* of using AI tools was raised (P30), underlining the need to address ethical considerations. Users²¹ desired *sources or references* to validate information, although this is not a barrier.

¹⁶ Respondents P12, P15, P24 and P25.

¹⁷ Respondents P6, P8, P20 and P33.

¹⁸ Respondents P4, P9 and P29.

¹⁹ Respondents P4, P16 and P20.

²⁰ Respondents P24 and P7.

²¹ Respondents P32 and P41.

Results indicating the responsible use of ChatGPT

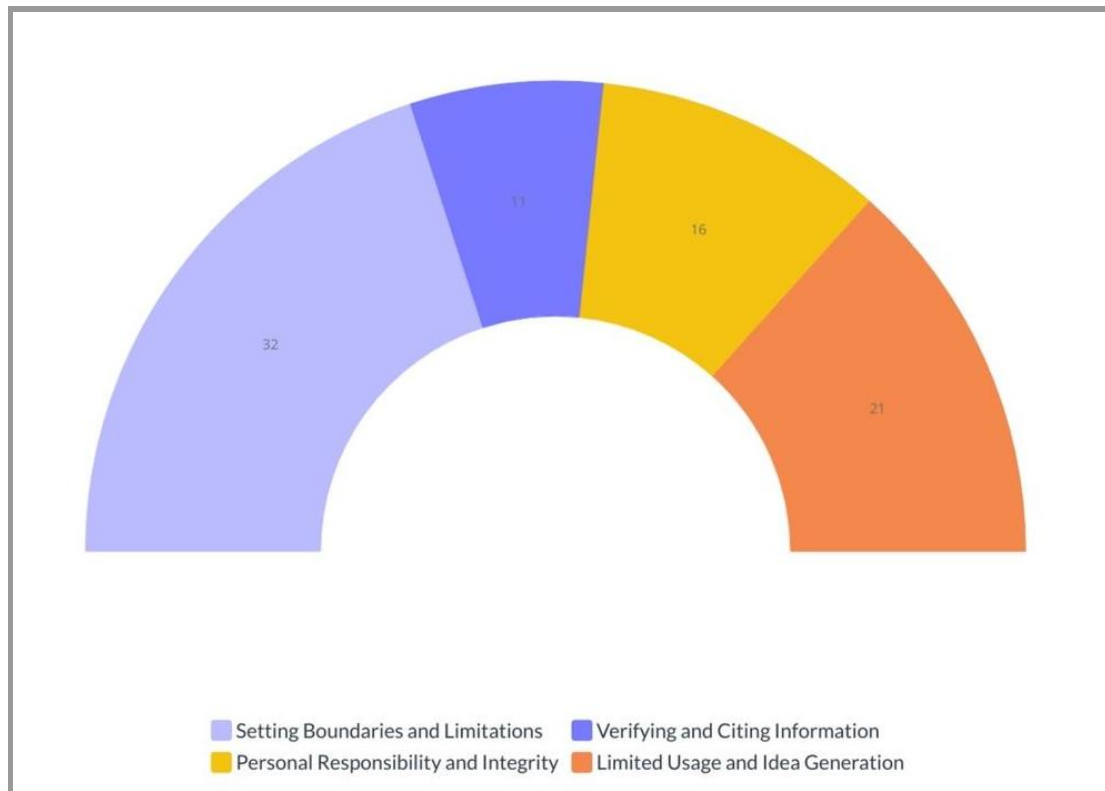


Figure 6: The responsible use of ChatGPT

Several themes emerged from participants' views on responsible ChatGPT use in research (Figure 6). The *setting boundaries and limitations* theme indicates ChatGPT should be used judiciously within defined boundaries, emphasising personal ownership of research.²² *Verifying and citing information* theme stresses critical evaluation and citation of ChatGPT-generated information.²³ The *personal responsibility and integrity* theme underscores upholding ethical standards and academic integrity²⁴ when using ChatGPT. Lastly, *limited usage and idea generation* reflects using ChatGPT for ideation and aiding thought formulation, but not for exhaustive research.²⁵ Overall, the participants' responses demonstrate a conscientious approach to the responsible use of ChatGPT in research.

²² Respondents P4 and P7.

²³ Respondents P8 and P20.

²⁴ Respondents P9 and P29.

²⁵ Respondents P15, P16, P41, and P43.

Results indicating opinions on how ChatGPT can be integrated into teaching and learning

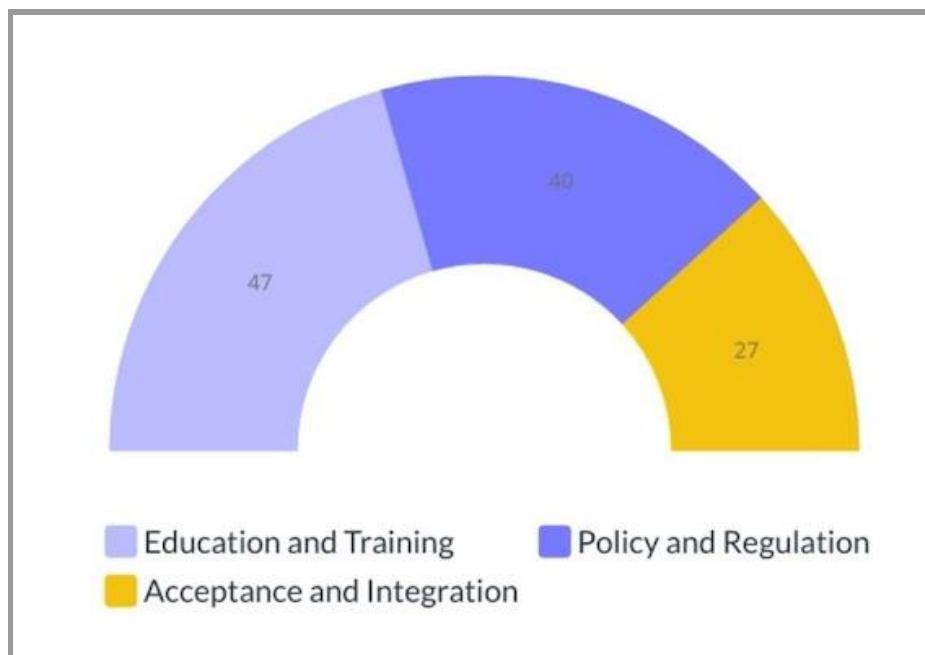


Figure 7: How to Integrate ChatGPT into teaching and learning

In response to how AI tools like ChatGPT might be incorporated into student learning and research (Figure 7), answers relating to *education and training* were most prevalent at 46.6%. Responses emphasised the need for guidance in ethical use of AI tools (P15) and effective question formulation (P33). Almost half (40%) of responses related to the theme *Policy and Regulation*, with participants²⁶ proposing clear AI usage guidelines and development of AI with ethical constraints (P16). The final theme, *acceptance and integration*, related to responses (26,6%) that highlighted the need to accept and integrate AI tools effectively into academia (P20). These themes reveal the complexities of integrating AI into education, requiring comprehensive education, policy creation, and AI tool acceptance.

Case study findings

This section examines the use of ChatGPT by a Design student researcher. The Design student in this case began using ChatGPT in the research process at an advantage²⁷ – having read many articles for several years. They wanted to find a “way in” to start their project. The student wanted to use ChatGPT to start writing a research project proposal (for a PHD by publication). The student researcher employed ChatGPT 3.5, following a systematic process for optimising the AI's contributions to their project. Table 2 delineates the steps that the student followed and presents the outcomes of their interaction with ChatGPT.

²⁶ Respondents P9 and P15.

²⁷ We acknowledge that this student may be considered better prepared than the average student embarking on postgraduate studies in South Africa. This is especially true, as the student has been reading on a subject for a while.

Table 2: A student journey with ChatGPT – Part 1 (authors 2023)

	Student feeling/ motivation	Student Action & Prompt	ChatGPT response
1	"All the info is in my head, and I am having trouble trying to shape that into a way forward"	Used a SELF AUTHORED Blog post to ask ChatGPT: <u>Prompt:</u> REWRITE this as a research problem statement	Wrote a research statement. Student: OK result but thin
2	"I needed more depth in the statement"	Used an important paper in the field. Copied the FINDINGS section to ask ChatGPT: <u>Prompt:</u> DISCUSS this research result	Wrote a discussion of the findings. Student: GOOD result - nice synthesis of the findings
3	"I wanted a better research topic"	Used the findings section (again) with original problem statement to ask ChatGPT: <u>Prompt:</u> SUGGEST research topics	Topic suggestions provided Student: POOR result
4	"I feel like ChatGPT didn't understand me"	Used the findings section (again) with original problem statement to ask ChatGPT: <u>Prompt:</u> SUGGEST TOPICS for further research	Further topics for research provided Student: GOOD result - many more applied options given
5	"I need some research objectives now"	Used the findings section (again) with original problem statement to ask ChatGPT: <u>Prompt:</u> WRITE research objectives for topic selected	Research objectives provided Student: GOOD result - but was missing the framework I needed. But I hadn't input any framework into the question.
6	"I like this framework, I'd like to include it in my study"	Used the favourite framework to ask ChatGPT: <u>Prompt:</u> How might the selected framework impact the study	Reasonable response to the question Student: GREAT result - gave some weight to the particular approach I'm interested in.
7	"I like Grounded Theory. Wondering how I could use it in my research"	Ask ChatGPT: <u>Prompt:</u> How could I APPLY Grounded Theory to my research	Research steps provided Student: POOR result - It was very generic and general. It gave research steps to data collection, etc. It did not use any application of the method, nor whether it would be a suitable theory.
8	"Decided to abandon the Grounded Theory track. I don't think it understands"	Ask ChatGPT: <u>Prompt:</u> What RESEARCH DESIGN would be suitable for my study?	Research steps provided Student: OK result - It was very generic and general.

Upon reflecting on the initial usage of ChatGPT, the student expressed that the research design result was more suited for an undergraduate or master's level task, as the depth and application of research provided by the AI fell short of the required standard for a doctoral proposal. This reflection instigated a discussion among the authors regarding the potential of ChatGPT to function as a supervisor.

Motivated by these conversations, the student embarked on a series of further interactions with the AI. Leveraging the more advanced version, ChatGPT 4, the student engaged in a role-play scenario to

test the AI's potential to offer specific methodological suggestions. Table 3 presents an account of the subsequent steps taken by the student.

Table 3: A student journey with ChatGPT – Part 2 (authors 2023)

	Student feeling/ motivation	Student Action & Prompt	ChatGPT response
1	"Maybe I should ask ChatGPT to be the supervisor?"	Ask ChatGPT: <u>Prompt:</u> ACT LIKE A PHD SUPERVISOR and suggest 5 research methodologies to match my research problem. GIVE AN OVERVIEW of each method and WHY it would be a good fit	Gives 5 research methods Student: GOOD result - all 5 options are reasonable suggestions
2	"I need a less generic selection of methods"	Rephrase the question and include some information on specific design research methodologies. Ask ChatGPT: <u>Prompt:</u> ACT LIKE A PHD SUPERVISOR and suggest 5 research methodologies to match my research problem. GIVE AN OVERVIEW of each method and WHY it would be a good fit	Gives 5 research methods Student: GOOD result - included more design specific suggestions Also a POOR result - This is not accurate – as it includes some research tools, not methods

The student commented that they would like to follow that process of ChatGPT prompt, with “the (real) supervisor sitting next to me”, as it would provide ample material that could be critiqued swiftly by the supervisor. The supervisor could also identify if the student was heading in the wrong research direction.

The main reflections of the Student researcher were:

- *Speed:* ChatGPT is a useful way to sift your ideas fast
- *Logic:* ChatGPT is a useful tool to put my thoughts into a logical format – and out of my head. By acting as a sounding board/interlocutor and allowing for role playing, ChatGPT enables me to sort my ideas. It can suggest other ideas for research directions
- *Building confidence:* ChatGPT is a useful tool to make my thoughts into a presentable format – before I need to present or discuss them with others. I feel more prepared to answer questions – I am bad at asking questions of the supervisor. This suits my avoidance behaviour and helps me with my language (second language English).

Discussion

Our research contributes in significant ways to the expanding knowledge surrounding the application and impact of AI tools in academic settings, specifically within postgraduate contexts. The results take on greater importance when observed through the lens of the South African landscape, providing insights into how such AI tools might be instrumental in fostering a more robust postgraduate culture both locally and globally.

Our findings underscore the transformative potential of AI tools like ChatGPT in reshaping the pedagogical landscape at a postgraduate level. The data suggest their utility in facilitating research tasks such as summarising, paraphrasing, and reviewing literature, reflecting broader international

dialogues on the role of AI in enhancing academic efficiency and productivity (Lund & Wang 2023; Alshater 2022).

This brings to light the pressing need for innovative pedagogical approaches that incorporate these emerging technologies. The discourse around adapting pedagogy and educational praxis to AI-driven shifts (Baidoo-Anu & Owusu Ansah 2023; Kasneci et al. 2023) finds a clear echo in our study. Here, it is about cultivating a learning environment where AI tools are used effectively to streamline the research process while ensuring a critical understanding of these tools – their functions, their use, and their limitations.

An intriguing finding from our research is that ChatGPT seems able to generate ideas and kickstart the research process with suggestions. This observation challenges the simplicity of the concern that as ChatGPT does not do well in creativity and critical thinking (Mhlanga 2023), the result of using it would always result in generic outcomes. We suggest, like Halaweh (2023) and Kasneci et al. (2023), that if combined with best practices from human authors, AI tools might stimulate a more dynamic and creative approach to research, enriching the postgraduate learning experience.

Simultaneously, our study sheds light on the challenges and limitations associated with the use of AI tools like ChatGPT, including issues regarding accuracy, potential over-reliance, and concerns related to creativity and originality. This highlights the importance of developing a pedagogical framework that promotes the responsible and critical use of AI tools, resonating with broader calls for ethical AI practices (Kooli 2023; Mhlanga 2023).

Our study also brings to the fore certain barriers to effective AI tool use, such as access issues and language barriers. These challenges are especially relevant in the South African context and provide important insights that can guide improvements in AI tool design and inclusivity. This could help enhance accessibility and usability for a diverse range of student populations.

Mapesela, referenced in Akala (2021, p. 2), reiterates that despite its pivotal role in postgraduate research, doctoral supervision is relatively poorly understood. Heath and Yousefi, Bazrafkan and Yamani (in Akala 2021) provide some of the roles the supervisor is expected to play. These include “numerous formal and informal competencies”, that become needed in relation to the students’ capabilities (Koen & Bester, in Akala 2021). Many of these qualities are also required in the supervision role of postgraduate and master's level students. A single supervisor may have heavy demands on them because of this variety of roles. However, the entire scope and weight of supervision responsibilities can be lessened by considering other role players (Bitzer & Albertyn 2011, p. 882). Table 4 indicates human supervision roles and suggests which of these roles could likely be fulfilled by ChatGPT.

Table 4: The potential of ChatGPT as a digital supervisor (built from Akala 2021)

	Human Supervisor roles	Potential of ChatGPT – as a Digital supervisor
1	Provide time	No
2	Provide research expertise	Can provide limited expertise.
3	Support to foster research skills	Can provide research tools, but with limited application/s
4	Support to foster professional attitudes	Unlikely, re ethical concerns
5	Mentoring in the research process	Unlikely
6	Create a professional relationship	Unlikely
7	Selection of research topic	Yes
8	Preliminary design research	Yes
9	Assist students with personal problems	No
10	Assist with Students' academic language and presentation	Yes

The summary in Table 4 suggests that ChatGPT and similar AI tools could potentially drive the nurturing of a stronger postgraduate culture in South Africa. By boosting efficiency, kickstarting the writing process, and aiding the research process, these tools might help to create a more engaging and supportive postgraduate environment. Within the South African setting, their capacity to provide targeted support for second language learners might open up avenues for greater academic inclusivity and success. However, these tools are not substitutes for the crucial role of human supervisors, and their effective usage hinges on students' understanding of AI operational aspects and ethics. As AI continues to evolve and permeate academia, a balanced, thoughtful integration with current pedagogical practices, emphasising a collaborative approach between AI tools and human actors, will be essential in leveraging the benefits of AI in fostering a thriving, inclusive, and innovative postgraduate culture.

Conclusion

While our study provides significant insights into the current use of AI tools in postgraduate education, it also lays the groundwork for potential future investigations. Several areas emerge as relevant avenues for further exploration, providing a more nuanced understanding of AI's place in academia.

The design of a comprehensive pedagogical strategy tailored towards integrating AI tools into the postgraduate curriculum is clearly crucial. Further studies could delve into the specifics of this

framework, outlining how AI could be balanced with more traditional methods, thereby nurturing students' critical thinking skills while encouraging ethical AI use.

Our study also underlines limitations in current AI tools, such as accuracy and concerns over originality and copyright. These pose fascinating questions for subsequent research: How might these issues be resolved to bolster AI's academic utility? An especially pertinent question for the field of design is whether there is a need to cultivate our own Design AIs, to cater specifically to the needs of postgraduate design students. Given the comparative youth of the design field, the volume of published design articles is somewhat constrained – particularly when contrasted with older, more developed academic domains (Bayazit 2004, p. 28). How do we guarantee the authenticity of data sources utilised by AI in aiding design postgraduates? Furthermore, how can we establish guidelines that diminish over-dependency on AI, encouraging greater independent thought and creativity in students?

One aspect of our findings is the barrier to access and language limitations, particularly relevant to the South African context. Future research must address these challenges, investigating how AI tools could be more inclusive and multilingual, ensuring equitable access across diverse student populations.

Lastly, our research prompts us to consider AI's impact beyond direct academic applications. It would be beneficial for future work to delve into AI's role in enhancing other aspects of postgraduate education. Although it can currently act as a sounding board or interlocutor (Jeon & Lee 2023), roles such as mentorship, collaboration, and supervision need further development.

While this was a mere introduction to the use of AI in design research, we conclude that *the digital supervisor has not yet arrived* – as the relationship building and support offered by the human supervisor have not yet been developed (in an equitable way). In addition, students would need specific preparation to maximise their efficient and ethical use of LLMs. There is the added concern that students may reject the human supervisor – as a result of the perceived challenge of managing a real-world relationship. Ultimately, this study illuminates a pathway towards further research, aiming to expand our understanding of the most effective and ethical ways to incorporate AI tools into postgraduate education. The implications extend beyond South Africa, potentially enhancing the global academic landscape and fostering a more vibrant postgraduate culture.

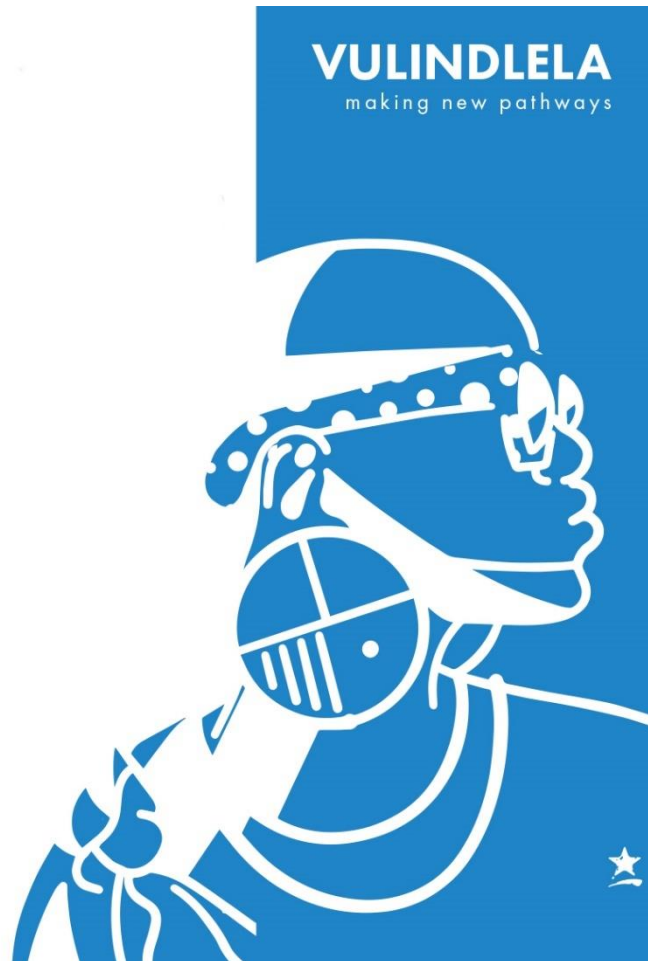
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SESSION 6: Connecting





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

An exploration of co-creating South African city brands to revive the tourism industry post a global pandemic

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Abstract

City branding involves establishing unique identities for cities using branding principles. While Johannesburg and Cape Town are among Africa's best-branded cities, their branding strategies were largely top-down, lacking collaborative stakeholder engagement. In the wake of the global pandemic that severely impacted tourism, there is an urgent need to revise these strategies through a co-creative approach. In South Africa, city branding activities can benefit the local tourism sector, which was severely impacted by the COVID-19 pandemic, with strict lockdown measures leading to a standstill in tourism activities throughout 2020 and 2021. As restrictions eased and businesses in the sector aimed to revive tourism, innovative approaches became necessary. This paper focuses on co-creating specific South African cities post-pandemic. Two online co-creation workshops were conducted with stakeholders to explore their perceptions and ideas about city branding. Our results underscore the critical role of stakeholder engagement in crafting city branding strategies that not only resonate with residents but also effectively revive the tourism industry post-pandemic. Engaging stakeholders also fosters a deeper connection between the city brand and its people, which in turn might inspire unity. The study emphasises the need to revisit the city brands of Johannesburg and Cape Town and highlights the value of co-creation workshops as a methodological tool for designers and design students. It also provides a foundation for future research on city branding and reviving other industries, which may be relevant in other contexts, such as post-war Ukraine.

Keywords: City branding, co-creation, global pandemic, South Africa, Tourism industry.

Introduction

The COVID-19 pandemic had a significant effect on the entire world, causing death tolls, economic ruin, and changes in social interactions (Committee for the Coordination of Statistical Activities 2020). The tourism industry is recognised as a crucial sector advancing economic change and creating job opportunities had been particularly hard hit (World Travel and Tourism Council 2020). Over 700,000 livelihoods and an annual economic contribution of R273.2 billion were at risk in the South African tourism industry during the pandemic (Tourism Business Council South Africa 2020). Though there has been an increase in tourist arrivals during 2022 in South Africa, the industry is still 44,3% behind where it was in 2019 (StatsSa 2023). Businesses had to modify their procedures to ensure tourist safety as well as think about how to promote tourism in the country when restrictions were lifted to revive the

struggling industry. Branding is essential in determining how tourists view cities and how trustworthy and alluring they are as travel destinations (Shoab & Keivani 2015, pp. 254-263). In the wake of the pandemic's devastating impact on tourism, the need for a more resilient and inclusive city branding strategy has never been more urgent. Our co-creative approach not only engages diverse stakeholders but also offers a roadmap for crisis recovery. This paper explores the co-creation of South African city brands to revive the struggling tourism industry in the aftermath of the global pandemic.

South African city brands

City branding involves creating a unique identity for a city that represents its values, culture, and attributes (Wu & Chang 2022, pp. 34-36). It is a process of communicating and managing the city's identity to differentiate it from other destinations (Jojic 2018, p. 151). City branding contributes to the socio-economic development of urban areas (Zenker & Erfgen 2014, pp. 225-234) and is rooted in concepts like destination branding, place marketing and place identity (Jojic 2018, pp. 151-152). A successful city brand enhances reputation, stimulates tourism, attracts investment, and improves the quality of life (Jojic 2018, pp. 151-152; Wu & Chang 2022, pp. 34-36). Key elements of city branding may include values, beliefs and culture that speak to different stakeholder groups, similar to corporate branding (Jojic 2018, p. 151).

South Africa consists of many diverse and unique destinations, and every province has something different to offer. A quick search on the internet reveals that Cape Town in the Western Cape province and Johannesburg in the Gauteng province are prominently listed as “must-see” places in South Africa. In the most recent Brand Finance City Index (2023), Cape Town was identified as the best-branded city on the African continent and 60th globally, followed closely by Johannesburg in third place for Africa and 72nd globally (Figure 1 for the brand identities of these cities). However, Johannesburg also made the list of the top ten destinations that do not live up to travellers' experiences on TripAdvisor (Mitchell 2023).



Figure 1: City branding of Cape Town and Johannesburg.

- 1) City of Cape Town logo (City of Cape Town 2023); 2) Table Mountain National Park, Cape Town, South Africa (D’Silva 2019); 3) City of Johannesburg logo (Joburg 2018); 4) Johannesburg, South Africa (Da Paixao 2020)**

Cape Town is branded as a beautiful and inspiring city known for its architecture, landscapes, and inner-city revitalisation (Scholvin 2022, pp. 357–371). It markets itself as an "opportunity city" with global competitiveness and has been recognised as Africa's top city brand (Nxumalo 2023). Johannesburg, on the other hand, emphasises communication, finance, and transportation facilities in its city brand, but critics argue that its revitalisation efforts have fallen short (Scholvin 2022, pp. 357–371). Despite this, Johannesburg has been ranked as the most culturally vibrant city in Africa, highlighting its support for arts and culture (Scholvin 2022, pp. 357–371). Exploring co-creation in city branding can lead to a more comprehensive and effective brand that promotes value creation and encourages brand ambassador behaviour from locals. Although both cities are well branded, it might be worthwhile to explore co-creating city brands that lead to a deeper understanding of the city and its brand (Marques & Borba 2017, pp. 86-93) that promotes value creation (Jojic 2018, p. 151) and brand ambassador behaviour from locals (Wassler, Wang & Hung 2019, pp. 437-446).

Co-creating city brands

City brand practitioners play a vital role in leading the city branding process, engaging stakeholders, and translating brand values into a desired tourist experience (Moilanen 2015, pp. 216–225). However, engaging diverse stakeholders with conflicting objectives can be complex (Moilanen 2015, pp. 216–225). Limited understanding of branding theory among stakeholders, especially in the public sector, poses a challenge. Active involvement of residents as brand ambassadors is crucial for successful brand execution and sustainability (Wassler, Wang & Hung 2021). By involving stakeholders and implementing a city brand that authentically represents locals, practitioners can enhance brand engagement and positive brand-related behaviours (Ambroise et al. 2014, pp. 273-285). Interactive and qualitative research designs that incorporate participative action are best suited to understand stakeholders' perceptions and co-create city brand strategies (Lucarelli 2018, pp. 260–271).

There is a growing recognition of the need to explore innovative approaches to revive the tourism industry, including co-creating city brands (Tregua et al. 2020). Co-creation is a collaborative process where stakeholders come together to co-create solutions and ideas that address a common challenge or opportunity (Tregua et al. 2020). Such workshops offer benefits such as innovation, authenticity, and resilience (see Eshuis, Klijn & Braun 2014, pp. 151-171; Zenker & Erfgen 2014, pp. 225-234; Ritchie & Jiang 2019, pp. 3465-3493). Challenges include coordination, conflict resolution, resource allocation and implementation. Therefore, it is recommended that the best practices of inclusivity, preparation, skilled facilitation and clear action plans and responsibilities for implementing the outcomes of co-creation workshops be followed (see Eshuis, Klijn & Braun 2014, pp. 151-171; Zenker & Erfgen 2014, pp. 225-234; Ritchie & Jiang 2019, pp. 3465-3493).

Co-creation, as a collaborative endeavour, has gained significant traction in various fields, from arts to business. However, like any approach, it is not without its challenges and criticisms. Zeilig et al. (2018, pp. 45-55) discuss the inherent difficulties of a co-creative approach, particularly highlighting the issues of power relations and the limitations of inclusivity. This sentiment is echoed by Jordan and Babrow (2013, p. 215), who argue that collaborative, creative design work presents a unique set of communication challenges, including the continuous effort to suspend normal inclinations to understand and appraise what we understand. Such challenges can be exacerbated by the complexities of power dynamics and the need for equitable dialogue in co-creative processes, as noted by Baumann and Le Meunier-Fitzhugh (2015, p. 295). Roig et al. (2014, p. 642) provide a nuanced understanding of co-creativity by analyzing practices, especially during moments of conflict and change. Their study reveals clashing models of co-creativity, with varying approaches to peer

production and hierarchy. This is further complicated by the introduction of technology into the co-creative process. While technology can facilitate collaboration, it also introduces new challenges. For instance, the use of platforms like Microsoft Teams and Mural in co-creative settings remains an area ripe for exploration. Säwe and Thelander (2015, p. 450) caution against an unreflexive use of co-creative strategies, especially in non-commercial settings, suggesting that it can lead to a lack of value creation or even co-destruction. This highlights the need for careful consideration and planning when implementing co-creative approaches.

However, it is worth noting that co-creation is not universally criticised. For instance, Xu et al. (2020, p. 7) found the co-design approach beneficial in engaging participants, allowing them to express their creativity and articulate the root of clinical problems. Similarly, Guzdial and Riedl (2019, p. 12) present a framework to understand the design of co-creative systems, suggesting that with the right design, co-creative AI systems can be effective. While the co-creative approach offers numerous benefits, it is essential to be aware of and address its inherent challenges. As the field continues to evolve, further research is needed to refine co-creative methodologies and ensure their effective implementation.

Co-creation workshops as method

The methodology for conducting co-creation workshops with stakeholders involves several key steps, including initiation and recruitment, preparation and setup, and realisation, facilitation, and engagement (see Benson, Pedersen, Tsalis, Futtrup, Dean & Aschemann-Witzel 2021, pp. 3-4; Co-create 2019, pp. 18-19). These steps should be carefully followed and adapted as needed to ensure the success of the co-creation process and the achievement of the desired outcomes. This paper reports only on the first few steps proposed due to the limited scope of the research study from which this paper originates.

Two virtual co-creation workshops were conducted online via Microsoft Teams and Mural in June 2021. These workshops also served as experiential learning platforms for design students, allowing them to understand the complexities and nuances of stakeholder involvement in city branding as they involved residents, tourism sector workers, and business owners from Johannesburg and Cape Town. Mural was chosen as the primary co-creation tool due to its collaborative features and ability to overcome geographical constraints (Kim et al. 2020, pp. 180–192; Wallgren, Babapour & Eriksson 2021, pp. 1787-1796). It offers a versatile canvas for ideation with various visual tools and templates, promoting active participation and a sense of ownership among team members (Kitch 2023). Its interactive interface fosters an immersive experience essential for successful co-creation workshops (Kitch 2023). The following is the step-by-step process followed for conducting the co-creation workshops:

Initiation and recruitment

Initiating the research and recruiting participants were vital steps in the co-creation journey. Diverse stakeholders, such as city officials, tourism industry representatives, and community members, were identified and invited to participate. Their involvement ensured a wide range of perspectives in the process. Recruitment involved explaining the research purpose, objectives, and extending invitations to the virtual workshops. This early engagement fostered a sense of ownership and commitment among participants towards the co-creation process.

Preparation and setup

The virtual co-creation workshops were prepared by sending email invitations to stakeholders with a brief overview of the workshop's purpose and aim. The email included a detailed workshop agenda, clearly outlining the structure, topics, and intended outcomes. The collaborative nature of the process and the goal to co-create city brands for revitalising the tourism industry were emphasised. Materials and resources were also prepared, and an online environment was set up on Microsoft Teams and Mural. This preparation phase follows recommended best practices of Zenker & Erfgen (2014, pp. 225-234); Benson et al. (2021, p. 4) and Co-create (2019, p. 39).

Title: Proposed Co-creation City Branding Workshop Structure & Agenda
Duration: 4 hours

Item	Section	Description	Instruction/activity	Outcome	Tools	Time
1	Introduction	Facilitator will introduce themselves and set expectations for the workshop. <ul style="list-style-type: none"> Why are we here today? Icebreaker and participant introductions Rules of engagement How to use Mural (if the workshop is virtual) 	Ice breaker: "Once upon a time" Respondents will be asked to share their first-ever job with the group along with one thing they loved about it, and one thing they hated.	The team has a clear idea of what to expect from the workshop.	<ul style="list-style-type: none"> PowerPoint Presentation Mural Microsoft Teams 	20 minutes
2	Co-analysis	What are the current challenges facing the tourism industry in South Africa? <ul style="list-style-type: none"> An exploration of stakeholders' biggest challenges Grouping these challenges into themes and identifying common challenges Prioritising the challenges that need to be addressed (what are the critical issues?) 	<ul style="list-style-type: none"> Lightning-talk sessions with How Might We (HMW) statement drafting Evaluating and grouping HMW statements Voting on the most pressing problems to solve for 	A clear and deeper understanding of what the biggest challenges are while creating some common ground for the stakeholders to encourage them to start collaboratively thinking towards solutions to these challenges.	<ul style="list-style-type: none"> PowerPoint Presentation Sticky notes Markers Mural Microsoft Teams 	45 minutes
3	Co-design	How do we brand the city (JHB/CT) to revive tourism? <ul style="list-style-type: none"> Allowing stakeholders to collaborate creatively using strategic templates and discussion to draft prototype city brands Addressing any concerns and disagreement that may arise 	<ul style="list-style-type: none"> Outlining a city-brand blueprint Understanding the thinking behind the brand Identifying the focal points or pillars the brand is built on 	A prototype city brand and city brand blueprint based on the collaborative efforts of the stakeholders.	<ul style="list-style-type: none"> PowerPoint Presentation Sticky notes Markers Mural Microsoft Teams 	90 minutes
COMFORT BREAK						15 minutes
4	Co-evaluation	What do we think about our proposed city brand? <ul style="list-style-type: none"> Identifying the perceived challenges that participants feel the brand poses Brainstorming ideas for how to improve or address any shortfalls 	<ul style="list-style-type: none"> Identifying problematic areas and gaps in the proposed brand Refining the proposed brand accordingly 	Acknowledging the team's thoughts, feelings, and suggestions regarding the ideal city brand and refining the prototype.	<ul style="list-style-type: none"> Voting stickers Sticky notes Markers Mural Microsoft Teams 	30 minutes
5	Co-implementation	How do we make this happen? <ul style="list-style-type: none"> Identifying key roles and responsibilities associated with a successful implementation of the proposed brand 	<ul style="list-style-type: none"> Allocating tasks to various key stakeholder/players to determine what it would take to achieve a successful implementation of the city brand 	A clear strategy regarding how stakeholders feel that the implementation of their proposed brand should be managed.	<ul style="list-style-type: none"> Sticky notes Markers Mural Microsoft Teams 	30 minutes
6	Closing	Thanking participants for their time and concluding the workshop	<ul style="list-style-type: none"> Opening the floor for concluding thoughts 	N/A	<ul style="list-style-type: none"> Microsoft Teams 	10 minutes
TOTAL						240 minutes

Figure 2: Co-creation workshop agenda

Realisation, facilitation, and engagement

The workshops were facilitated by the first author, who has skilled facilitation experience as recommended by Zenker and Erfgen (2014, pp. 225-234). The sessions began with an introduction to the co-creation process, the aim of the workshops, necessary background information, and an overview of the activities, following the guidelines of Benson et al. (2021, p. 4) and Co-Creat (2019, p. 39). An orientation session was conducted to explain the rules and guidelines of the workshop, how interaction on Microsoft Teams would work, and a walk-through on how to use Mural for the workshop activity. This ensured stakeholders were comfortable with the tools and established a foundation for productive engagement.

Interactive activities and exercises were used, following the approach suggested by Co-Creat (2019, pp. 17-18), to generate ideas and solutions for co-creating city brands. Mural's interactive whiteboard feature was employed for the workshop activity, enabling participating stakeholders to freely express their ideas and thoughts regarding city branding and the revitalisation of the tourism industry. The use of Mural's board facilitated the capture of a diverse range of inputs, allowing stakeholders to visually organise their thoughts, view, and build upon others' contributions. The board served as a dynamic document that evolved as the brainstorming session progressed. Group discussions were

encouraged during the workshops and were moderated by the facilitator to give all participants a voice (see Co-create 2019, p. 16).

Stakeholders were invited to reflect on their experiences throughout the co-creation process and provide their thoughts. This allowed for an assessment of their perspectives on the generated ideas and an evaluation of the effectiveness of the co-creation process. Open-ended questions were posed to guide the reflection and encourage thoughtful responses.

Data collected during the workshops

In co-creation workshops several types of data can be collected to ensure a comprehensive understanding of the co-creation process and the development of city brands, namely:

- Observational data involves observing stakeholders' interactions and behaviours during the co-creation workshop. As a facilitator, I took note of stakeholders' engagement, interactions, and emotional responses in a notebook. These observations provided valuable context to the written inputs, offering insights into their motivations and attitudes. The observational data helped manage participating stakeholders and enrich the analysis and understanding of the co-creation process.
- Verbal data consists of stakeholders' spoken words during the workshop. The workshops were recorded using Microsoft Teams (audio and video) and later transcribed verbatim. These recordings and transcripts are securely stored in a password-protected folder on Microsoft OneDrive, accessible only to the researchers.
- Non-verbal data collected during the workshops included stakeholders' views, ideas, and suggestions captured on Mural boards and in the facilitator's notebook. This data provided valuable insights into stakeholders' perspectives and attitudes, complementing the verbal data. The Microsoft Teams platform facilitated the collection of non-verbal data through visible cues such as hand-raising and emotive reactions, as well as the chat feature for comments and questions. These cues and interactions enriched the understanding of stakeholders' engagement levels and provided a nuanced perspective on the co-creation process.
- Artefacts are tangible items that are created or produced during the co-creation workshop. Artefacts created and produced during the workshops were the Mural boards that captured the brainstorming and idea-generation phase of the workshops (Figures 4 and 5 for artefact samples). Other artefacts include the concept maps generated as part of the data analysis section of this paper.

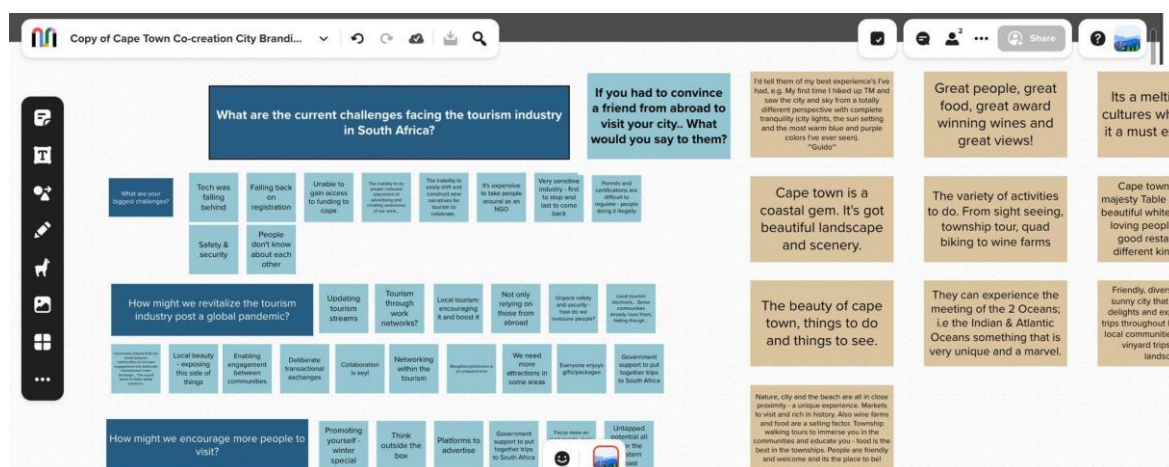


Figure 4: Sample artefact of Cape Town's brainstorming and idea-generation board on mural

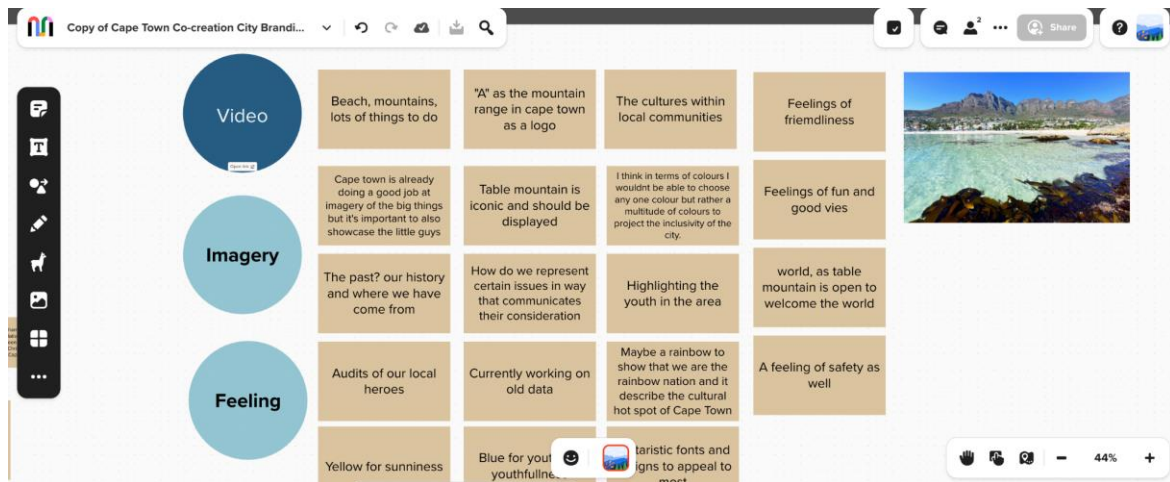


Figure 5: Sample artefact of Cape Town's brainstorming and idea-generation board on mural

- Demographic data includes information about the background, experience, and characteristics of the stakeholders who participate in the co-creation workshop. Stakeholders participating in the co-creation workshops included city residents (n = 12; n = 6 per city) and representatives from the tourism sector (n = 12; n = 6 per city). The tourism sector participants comprised of hotel, B&B managers, owners, tour operators, cultural event coordinators, and restaurant industry managers/workers. Figure 6 provides a breakdown of the stakeholders' demographic information, including age, gender, background, and experience.

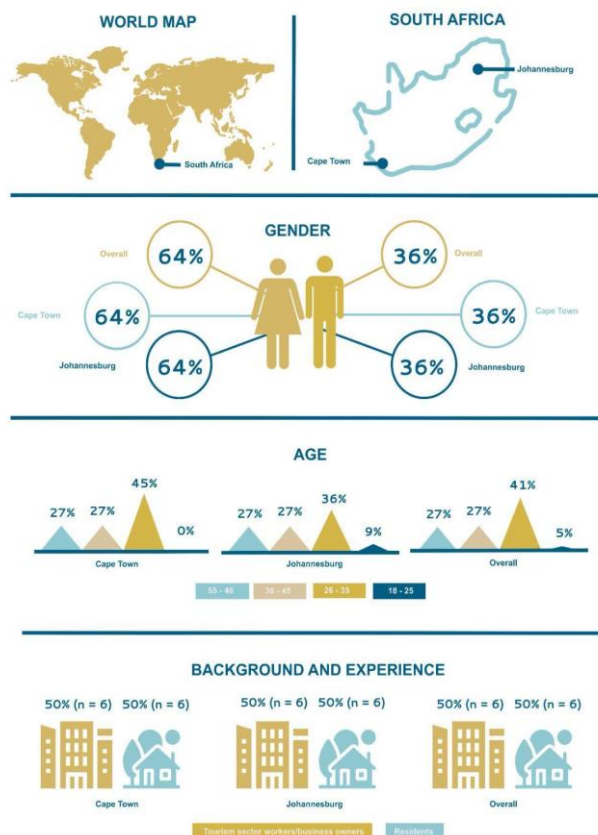


Figure 6: Demographic profile of participating stakeholders (n = 24)

Findings and discussion

The data from the two co-creation workshops was analysed, coded, and grouped together according to the emerging three themes that relate to city branding, namely the challenges of branding cities, who are the stakeholders that need to be involved, and how the city brands can be successfully implemented (Figure 7). The three main themes that will be discussed in this section are the challenges of city branding, stakeholders that should be involved in city branding, and successful implementation of city branding.

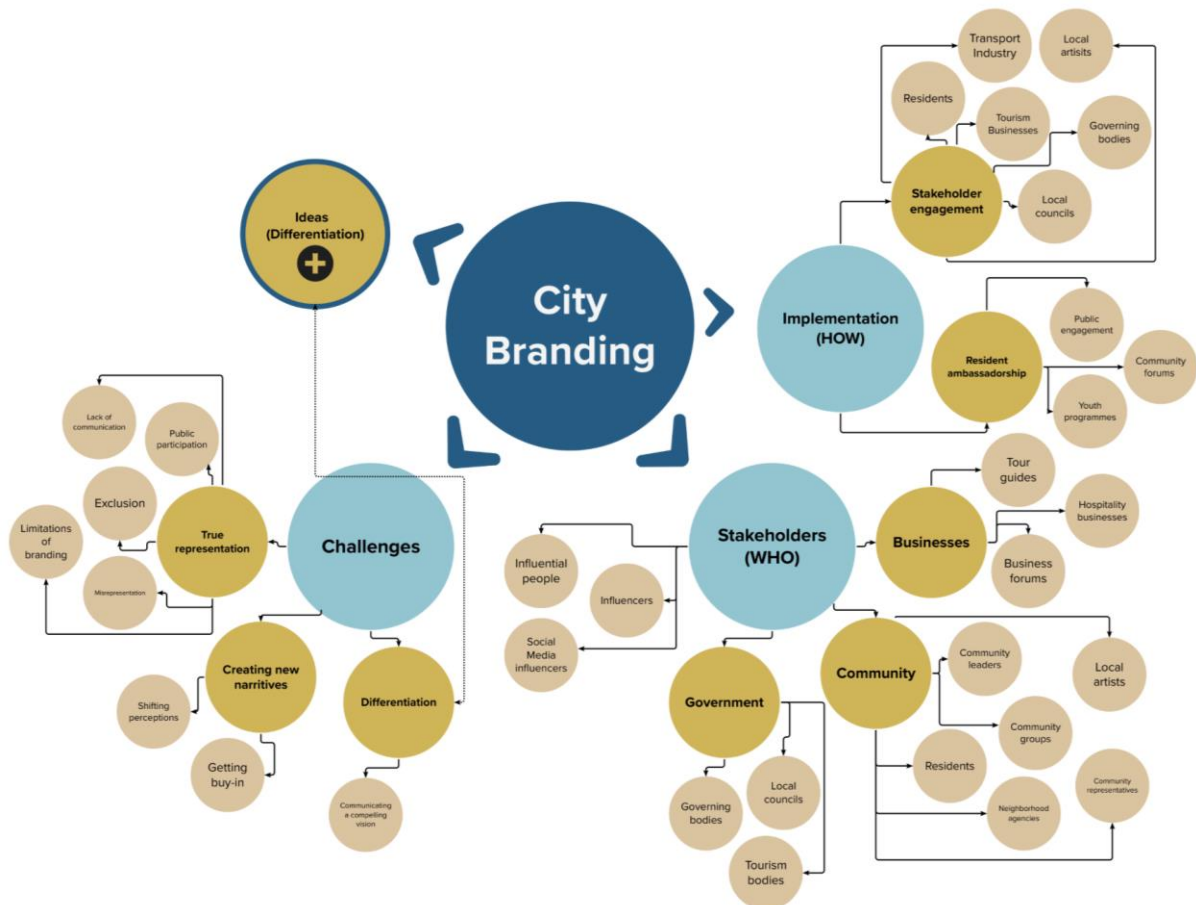


Figure 7: Qualitative themes and codes emerged from the two co-creation workshops

Challenges of city branding

The stakeholders involved in the co-branding workshop were left with a whirlwind of ideas and emotions. They found themselves juggling a mixture of anticipation, worry, and resolve as they dove into the key issues identified for city branding, namely representation of the city, differentiation of the city from others, and creating new narratives for the cities.

The representation of the cities

The need for genuine representation was a common sentiment among the stakeholders. They understood the need to capture the distinctive qualities of Johannesburg and Cape Town, highlighting their rich diversity, cultural heritage, and vibrant energy. The participating stakeholders also recognised that a successful city brand should embrace the diversity, obstacles, and aspirations of the city as opposed to focusing only on its appealing characteristics. They were determined to reject stereotypical narratives of the cities and present a genuine image that would appeal to both citizens

and tourists. This can also counter the finding that Johannesburg does not live up to travellers' experiences on TripAdvisor (see Mitchell 2023).

A potential challenge would be a misrepresentation of the city in terms of culture sensitivity and exclusions of different groups (Cape Town Stakeholder 7).

I think one of the biggest challenges that we might face is not representing every side of Joburg [...] But I think some people might find that as a problem, especially if you're not exactly in the glorious side on a daily basis (Johannesburg Stakeholder 4).

We do have crime, but not necessarily within the city because the city is pretty well protected in terms of our tourists and our visitors. But I think we do have quite a bit of crime within the township areas (Cape Town Stakeholder 8).

Differentiation of the cities from others

The stakeholders were aware of the intense competition among cities on a global scale for attracting tourists, business opportunities, and talented people. During the workshop, they started to realise how crucial it was to set Johannesburg and Cape Town apart from other places. They debated how best to highlight the unique qualities of each city while also highlighting their individual advantages. They came to the realisation that differentiation would necessitate striking a delicate balance between highlighting shared qualities and highlighting the distinctive selling points of each city. Finding the right balance that would distinguish Johannesburg and Cape Town in a crowded market was a complicated task. It was interesting to note the different perceptions stakeholders had about their cities. Figure 8 provides a summary of the themes and codes that emerged from the brainstorming and ideation phase of the workshop on how to differentiate the cities from others.

We must always be able to like if you look at America, every city can summarise itself in like one centre. Right. Like New York, they say, the big apple and all the city that never sleeps, they've got these subtle brandings that are out there without having to pay for branding and marketing (Johannesburg Stakeholder 2).

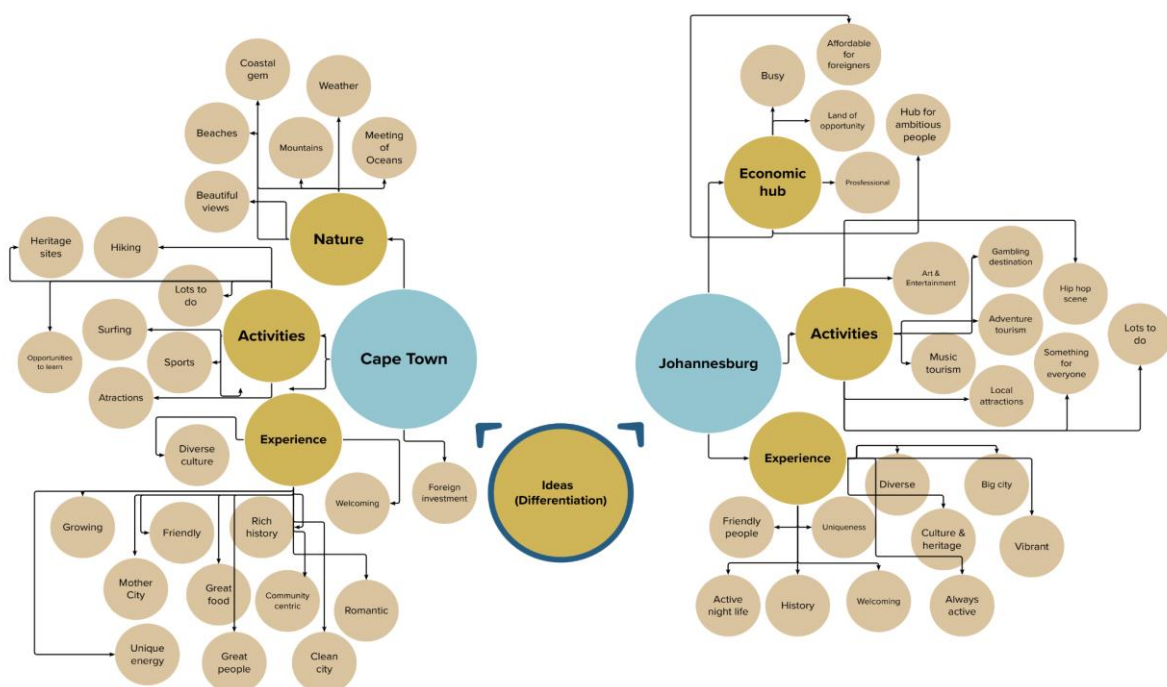


Figure 8: Ideas for the differentiation of the city brands of Johannesburg and Cape Town

The stakeholders' perception of the Cape Town brand emerged with key themes that encapsulated the city's unique identity (Figures 8 and 9). Nature stood out as a defining characteristic, with its breath-taking beauty and majestic mountains providing a backdrop to the cityscape. The meeting of the Atlantic and Indian Oceans was seen as a symbol of Cape Town's geographical distinction, offering a sense of awe and wonder during the workshop. The stakeholders also recognised that Cape Town had an abundance of activities and experiences to offer, which can cater to a wide range of interests. From hiking trails that showcased the city's natural splendour to a thriving sports scene, Cape Town was seen as an adventure playground with endless possibilities. The city's diversity was also celebrated, with a vibrant mix of cultures and people creating a rich tapestry of experiences. The stakeholders were impressed by the warmth and hospitality of the locals, contributing to the perception of Cape Town as a place where tourists would feel welcomed and embraced. Cape Town's reputation for excellent cuisine and culinary delights was acknowledged as a last point, further adding to the allure of the city as a destination. Overall, the stakeholders' perception of the Cape Town brand reflected a unique and diverse experience that combined natural beauty, adventure, cultural richness, and warm hospitality.

The amount of activities you can do in the space of a day in Cape Town is literally unbelievable [...] There's a diverse, enormous amount of things you can do in a day, which I think is a very unique, I think, for a city (Cape Town Stakeholder 9).

People in Cape Town are very friendly to visitors and they're very welcoming and they always highlight that (Cape Town Stakeholder 4).

Cape Town's have the majestic Table mountain. The beautiful white beaches. Fun loving people. And really good restaurants with different kinds of foods (Cape Town Stakeholder 6).



Figure 9: Wordcloud of emerging themes and codes of the Cape Town workshop

The stakeholders' perception of the Johannesburg brand emerged with key themes that captured the city's dynamic essence (Figures 8 and 10). Art and entertainment were central to Johannesburg's identity, with a flourishing creative scene that showcased the city as a cultural hub. Music tourism was seen as a significant draw, with a vibrant music industry and a diverse range of genres that attracted both local and international tourists. Johannesburg's status as an economic powerhouse was also

prominent, with the city being recognised as a thriving business and professional centre. Its big-city allure, with towering skyscrapers and bustling streets, symbolised the opportunities and possibilities that Johannesburg offered. The stakeholders acknowledged the city's active nightlife, filled with vibrant bars, clubs, and cultural events, contributing to a lively and energetic atmosphere. Overall, the stakeholders' perception of the Johannesburg brand reflected a city of opportunity, creativity, and vibrancy, where art, entertainment, economic growth, and active nightlife combined to create a dynamic urban experience.

If we put our branding out there as a money city, a big money city, unlimited job, unlimited, a money place, money that can only be good for all the tourism operators because you're going to get tourists coming in with that already programmed into their mind, money (Johannesburg Stakeholder 2).

My city is exiting and there are many social activities, you won't get bored and there are many places for you to visit [...] We have many historical and heritage sites that are worth visiting! We had 2 noble prize winners on one street! it's the place to be (Johannesburg Stakeholder 4).

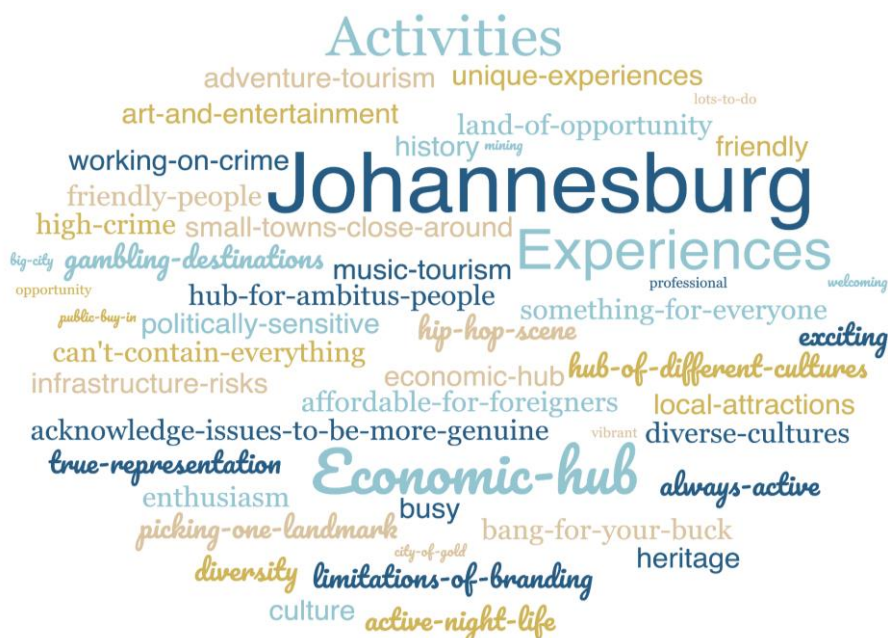


Figure 10: Wordcloud of emerging themes and codes of the Johannesburg workshop

Creating new narratives for the cities

The stakeholders understood that the stories that had been told about the cities in the past fell short of expressing their full potential and ambitions. The stakeholders agreed that new, compelling stories were needed to change perceptions and draw in a wide range of audiences. This required a different approach that encompasses engaging the public, involving regional governing bodies, business participation, and community projects to define the cities as vibrant, welcoming, and unique locales. The stakeholders, however, acknowledged the difficulty of dispelling ingrained myths associated with the cities and the continent and doing away with unfavourable stereotypes about the cities, such as the association with high crime and past inequalities.

We do have something unique and special in our Ubuntu and the fact that we have moved on and we do work together [...] We have a fantastic unique energy within our social structure (Cape Town Stakeholder 7).

There's people out there that think the highest crime, and some people are scared from back home. They think, oh, it comes to Jozi, you're going to get mugged, your corporate get stolen (Johannesburg Stakeholder 4).

Stakeholders that should be involved in city branding

The stakeholders involved in creating a city brand consisted of three key groups: government, communities, and businesses (Figure 7). Government stakeholders, including local councils, governing bodies, and tourism bodies, play a vital role in shaping the city's brand image and strategy through policy implementation, infrastructure development, and marketing initiatives. Community stakeholders, including residents and community leaders, are integral participants in the co-creation process, providing valuable perspectives and insights for an authentic and inclusive city brand. Business stakeholders, such as hospitality businesses, tour operators, and the transport sector, contribute their expertise in understanding market demands, identifying unique selling points, and implementing practical strategies to enhance the city's appeal. The collaboration of these diverse stakeholder groups ensures a comprehensive approach to city branding, capturing the city's essence while meeting the needs and aspirations of its residents.

We need to involve as much as possible every single part of Joburg every single rung of society (Johannesburg Stakeholder 5).

We are responsible for driving this thing forward because if it doesn't come from the bottom up, it's not going to happen (Cape Town Stakeholder 2).

Successful Implementation of city branding

Stakeholders identified two key themes for a successful city brand implementation during the workshop: stakeholder engagement and resident ambassadorship (Figure 7). They emphasised the need to involve residents, local government, tourism businesses, and local artists to ensure the brand reflects the city's aspirations and unique qualities, fostering ownership and pride. Stakeholders also highlighted the significance of public engagement initiatives, youth programmes, and community forums to establish a strong connection between residents and the brand. Empowering residents as ambassadors was seen as essential for authentic, relatable, and effective communication of the brand message. These themes underscore the importance of inclusivity, collaboration, and community involvement in shaping a successful city brand implementation.

I think if we only put responsibility one sector in terms of we say it's the government alone or it's the businesses or the tourism sector, I think we'd never really get anything done or we'll never get anything done to the best of its potential (Johannesburg Stakeholder 4).

Conclusion

Cape Town and Johannesburg have made significant strides in their city branding efforts, as reported at the start of this paper; however, it is important to acknowledge the shortcomings of the current city brands from the perspective of various stakeholders. The current city brands have established the cities' presence on the continent as indicated in the 2023 Brand Finance City Index; however, findings from the workshops indicate that the crucial elements of stakeholder engagement and resident ambassadorship might have been overlooked. It is imperative to involve stakeholders from various sectors in the city branding process to counter the identified challenges of (mis)representing the city, differentiating the city from other destinations, and creating new narratives for the cities that are

more suitable. Furthermore, engaging stakeholders may lead to a deeper connection between the city brand and the people it represents to inspire a sense of unity. This paper highlights the importance of teaching co-creation workshops as a methodological tool to enable designers (and design students) to create impact through their work with stakeholders on similar topics. This research offers valuable insights for design education, suggesting the incorporation of co-creative, stakeholder-driven approaches in academic curricula.

The way forward

The study highlights the need for further research to revisit and strengthen the city brands of Johannesburg and Cape Town. Participating stakeholders provided ideas for future co-creation workshops. Additionally, the study sets the foundation for future research on city branding and reviving other industry sectors, which may be applicable to post-war countries like Ukraine. Moreover, the research methodology employed here, especially the co-creation workshops, provides a template for hands-on pedagogical approaches in design education, offering design students an immersive learning experience.

I think there should be a competition to brand the city (Cape Town Stakeholder 3).

“Sell the idea beautifully to people [...] what's at the heart and the root of these [...] we should use them to be our influencers (Johannesburg Stakeholder 8).

Ethics

In the virtual co-creation workshops, rigorous adherence to ethical standards was upheld. Ethical clearance was obtained from the affiliated institution. Prior to the workshops, participating stakeholders were given comprehensive informed consent forms to ensure transparency about the research's purpose, procedures, and potential benefits and/or risks. The process emphasised the voluntary nature of participation and the right to withdraw at any time during the data collection phase.

To maintain confidentiality and anonymity:

- Participants' names were replaced with pseudonyms.
- Any identifying details, such as specific job titles or affiliations, were either omitted or altered to prevent recognition.
- Direct quotes used in the research findings were carefully reviewed to ensure they did not contain any identifiable information.
- This approach encouraged open and honest participation by assuring respondents that their identities would be protected.

Cultural sensitivity was a priority throughout the research process. The research team was particularly mindful of:

- Cultural norms and practices that could influence participants' responses or comfort levels.
- Potential power dynamics that might arise due to cultural or organizational hierarchies.
- Ensuring that all participants felt their voices were equally valued, irrespective of their cultural or professional background.
- Participating stakeholders were treated with respect, acknowledging their diverse experiences and cultural sensitivities. Digital data was securely stored using encrypted methods. This includes Mural boards, Microsoft Teams meeting recordings, transcripts, and consent forms, all of which were stored in password-protected folders with access limited to the research team.

The adherence to the above-mentioned ethical considerations cultivated a safe, respectful environment that encouraged meaningful collaboration in the workshops.

Acknowledgements

It is crucial to acknowledge the significant role that the various stakeholders played in conducting this research article. The collaborative efforts of these stakeholders have formed the foundation of this paper.

Declaration

This paper is the research output of a master's study conducted by the first author under the supervision of the second author. ResearchRabbit and Consensus artificial intelligence tools were utilised to gather relevant scholarly work and visualise paper networks. The author reviewed and edited the content after using these tools and takes full responsibility for the publication.

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Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

It's a zoo in there: Reflections and case studies from collaboration and participation design with Johannesburg Zoo Edu-Centre 2011–2023

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Abstract

Over the past twelve years, the University of Johannesburg Department of Graphic Design students have developed many feasible solutions based on human-centred and participation design principles. Implementing these design solutions to foster positive change is often problematic owing to funding and handovers; consequently, many projects remain at the conceptual stage, with few making a positive difference to the external stakeholders. Nevertheless, despite these challenges, students often produce high-end and in-depth results when working with stakeholders.

This paper uses the Johannesburg Zoo undertaking as a case study to argue that participatory design, combined with Constructivist Learning and Experiential Learning Theory, within multi-disciplinary collaborative projects, can be positioned as a sustainable, socially responsible design education model. This paper is based on a series of case studies on diverse participation design projects that UJ Department of Graphic Design has worked on with the Johannesburg Zoo since 2011. These projects have ranged from various paper toys for early childhood development (ECD) learning to potential funding initiatives, branding, mural designs, marketing, and, most recently, redesigning the zoo's education centre. The outcomes of these projects demonstrate that well-integrated participation design projects can assist in solving problems within communities, developing impactful and innovative ways to engage young minds about the zoo and its functions. The case studies highlight the creative pathways an evolving project can follow toward positive impact.

This approach has a political dimension of user empowerment and democratisation. Participation design is a method that shares design responsibility and increases design innovation.

Keywords: Collaboration, community engagement, education, human-centred design, participation design.

Introduction

The higher education landscape in South Africa has evolved to include sustainability, inclusivity, and methods for growing curriculums within digital platforms across many disciplines and courses. This paper explores participatory design in teaching and learning through a multi-disciplinary collaborative project stretching from 2011 to 2023. The paper aims to create greater awareness of this approach by describing a case study of socially responsible design education over 12 years of teaching. Within the

academic sphere of teaching and learning, new methodologies are applied and adjusted to enhance learning objectively through different enterprises, including culture and technology within the social dynamic. The Johannesburg Zoo project, utilising professional design expertise, combines a human-centred (HCD) and participatory philosophy through a user-centred approach that has the stakeholder's interest at heart. Participatory design for this project creates awareness amongst students, the Johannesburg City Parks as stakeholders, its plight, and current challenges.

In 12 years of experience with the Johannesburg Zoo Project (JZP), various problems with implementation that limit utilisation were identified. In 2011, UJ's Zoology Department requested a meeting with UJ Graphic Design (UJ GD) to encourage collaboration with the Johannesburg Zoo Education Centre. In August of the same year, members of the Department met with Nathi Mvula, the head of the Johannesburg Zoo's Education Centre. Whilst the meeting was positive, it was initially unclear how the field of graphic design could assist in solving the serious issues facing the centre, including poor maintenance and a lack of funding.

Internationally, the approach of many universities towards participatory design and human-centred design is specific and unique to their environments. Participatory design within South Africa is unique to the cultural, socio-political, and economic environment. Kang et al. (2015, p. 1) quote Sanders and Stappers, who posit that emerging design practice is moving from product-orientated to purpose-driven and user-centred to facilitate creative, collaborative outcomes. As social innovation and social design buzzwords traverse the landscape of debates and discussions within the design environment, designers are becoming an integral part of the innovation process that deals with the required complexities of social development. UJ GD's teaching and learning philosophy goal is to educate young designers to design for the greater good through co-design and participation design. The project moved from the undergraduate second-year level to the Graphic Design Honours Unit in participation design in 2018. The design thinking method combined with experiential (Kolb & Kolb 2008) and constructivist learning (Vygotsky 1978) approaches were applied to facilitate and mentor students within a dynamic environment with prominent stakeholders. Kolb and Kolb (2008, p. 43) define Experiential Learning Theory (ELT) as "a dynamic view of learning based on a learning cycle driven by the resolution of the dual dialectics of action/reflection and experience/abstraction". According to Chuang (2021, p. 6), the Constructivist Learning Theory practice allows students to self-direct and construct knowledge of the project through personal interactions: the lecturer acts as a mentor, assisting with collaboration where necessary.

The methods of participation

This paper follows a qualitative research approach, applying methods from Participatory Design (PD), Design Thinking (DT) and Social Design (SD) as research paradigms. In the *Participation Design Handbook*, Robertson and Simonsen (2013, p. 2) explain that:

Participatory design [is] a process of investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning between multiple participants in collective 'reflection-in-action'. The participants typically undertake the two principal roles of users and designers, where the designers strive to learn the realities of the users' situation. In contrast, the users strive to articulate their desired aims and learn appropriate technological means to obtain them.

During collating this paper, participatory design methods from Sanders and Stappers's (2021, p. 19) 'human-centred' approaches to design research were utilised, stipulating two primary PD methods: user-centred with the designer as author and participant, with the stakeholder as co-designer.

The UJ GD Participation Design unit incorporates a Design Thinking project structure. Brown (2008) defines design thinking as a "human-centred approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success". The DT method, because of its human-centred approach, thus complements the Participation Design for this unit.

Gregory (2003, p. 62) has worked with multidisciplinary collaborations in health informatics in Southern Africa and encourages the application of the Scandinavian participatory design tradition in South African design pedagogy. Gregory (2003, p. 62) identifies three principles of the Scandinavian approach relevant to the current study: "striving for democracy and democratisation; explicit discussions of values in design and imagined futures; and ways that conflicts and contradictions are regarded as resources in design". Within this collaboration style, the community identifies the problem. The community collectively works with the designer-researcher towards a solution (Steen 2011, p. 52). In the case of the JZP, the stakeholders identified the issues and collaborated with staff and students to achieve the desired outcome. The collaboration is ongoing and, therefore, lends an important sustainability factor to the project.

The UJ GD Honours Participation Design Unit has been taught since 2014 as a form of community engagement focused on Social Design, with an annual output of between 10 and 20 design projects for relevant stakeholders, comprising local businesses, community and university initiatives, NGOs, and governmental units. Within a constructivist and experiential framework, students apply participatory and design thinking methods to ascertain the problems these communities face and to find potential design solutions for their final submissions to the various stakeholders. Students meet stakeholders and work closely with them to design appropriate, feasible, sustainable, and preferably ecological design solutions that the stakeholders can apply at a minimal cost. These projects aim to embed collaborative co-design approaches into the departmental curricula to help foster crucial soft skills amongst students necessary to function within transdisciplinary collaborative projects, the design industry and society (Cronje & Enslin 2021, p. 307). The project also aims to create a positive social impact and provide students with guidelines to continue creating socially impactful designs after graduating. To date, 159 projects have been completed within the unit, with some success. The Johannesburg Zoo case study demonstrates the potential impact these kinds of design projects and initiatives have on effective social design practices.

Analysis

The case study approach for this paper aims to show the evolution of the PD method within a project as new methods were introduced and adjusted with every iteration of the project. This aligns with the conference's theme: applying new pathways to evolving projects.

2011, paper toys, Round 1

After the initial meetings in 2011, shortly before the project's commencement, the author purchased Louis Bou's 2010 book, *We are paper toys!* The book and consequent paper toy project proved seminal for the initial 2011 project and teaching through collaboration, design thinking, and participation.

2011 design challenge

The brief required that Second Year UJ GD students identify an animal from the zoo, study its shape, markings and form, and use its factsheet to create a double-sided folded full-colour A3 design that primary school children easily cut, fold and glue to create an animal from the zoo. Forty UJ GD second-

year students visited the Johannesburg Zoo in September to study various animals and programmes housed at the Zoo.

2011 engagement strategy

The Johannesburg Zoo staff provided the names of all animals selected to be used on the cover of the A3 brochure/booklet. In this initial collaboration, students were allowed to visit the zoo to observe and draw their chosen animal. The lecturer handled all DT, HCD, and PD processes, with limited interaction by students with the Zoo staff.

2011 design strategy

All students followed the standard five-step Design Thinking approach with this specific brief. Students 1) Empathised with children in designing and building, 2) Defined a 2D and 3D visual solution that would be feasible, 3) Ideated on the most appropriate design, 4) Prototyped the project, and 5) Tested their projects with the final submission buildup.

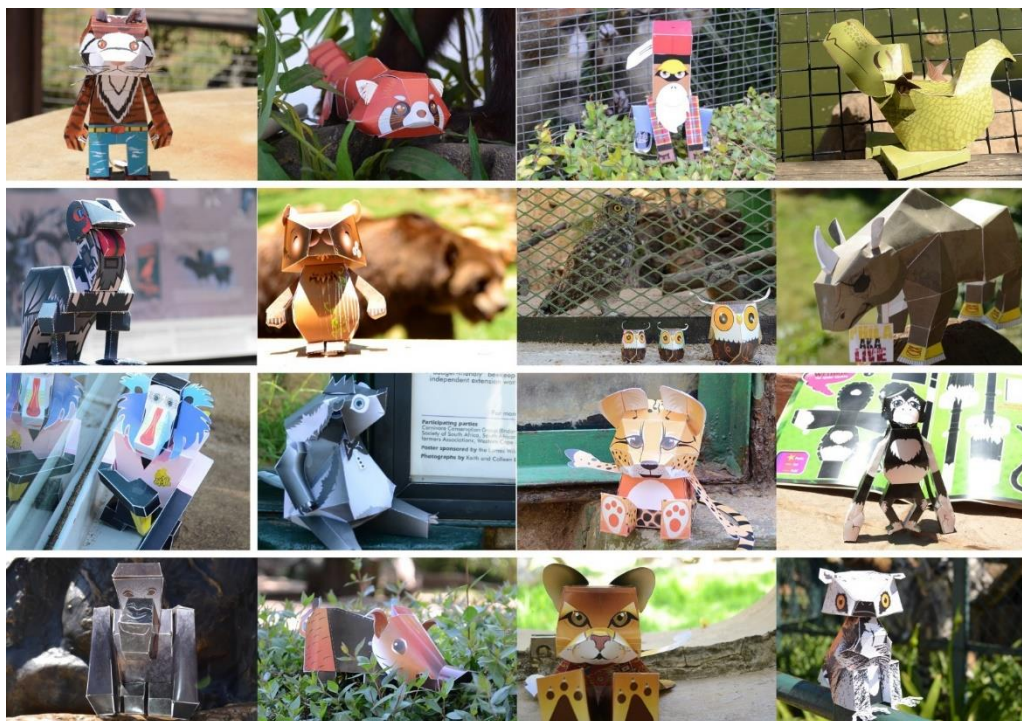


Figure 1: A few of the 2011 prototyped projects (project file)

2011 outcomes

Due to concerns about die-cut originality, little to no instructions and a lack of uniformity in the A3 designs, the project was not market-ready and required major revisions. The initial designs (Figure 1) were charming but not necessarily child-friendly. The work, however, fostered a positive sentiment towards the department and University, with the potential for future collaborations.

2015 design challenge

In 2015, UJ GD repeated the project within the Second Year of study in collaboration with UJ Department of Industrial Design. This initiative was to engage students to ensure more original templates.

2015 engagement strategy

The 2011 strategy was applied where all the students visited the zoo to observe and draw their chosen animal. The lecturers handled all DT, HCD and PD processes, and again, the students had limited interaction with the zoo staff.

2015 design strategy

All students followed the standard five-step Design Thinking approach with this brief, with tasks divided according to specialisation. Industrial Design students 1) Empathised with children in designing and building, 2) Defined a 2D and 3D visual solution based on origami that would be feasible, 3) Ideated on the most appropriate 3D template, 4) Prototyped the project, and 5) Tested their projects for their final submission. The templates and folding instructions were handed over to the Graphic Design students, who, in turn, 1) Empathised with children in designing and building, 2) Defined a 2D design style that would be feasible and attractive to children, 3) Ideated on the most appropriate character design, 4) Prototyped the project, and 5) Tested their projects with the final submission.

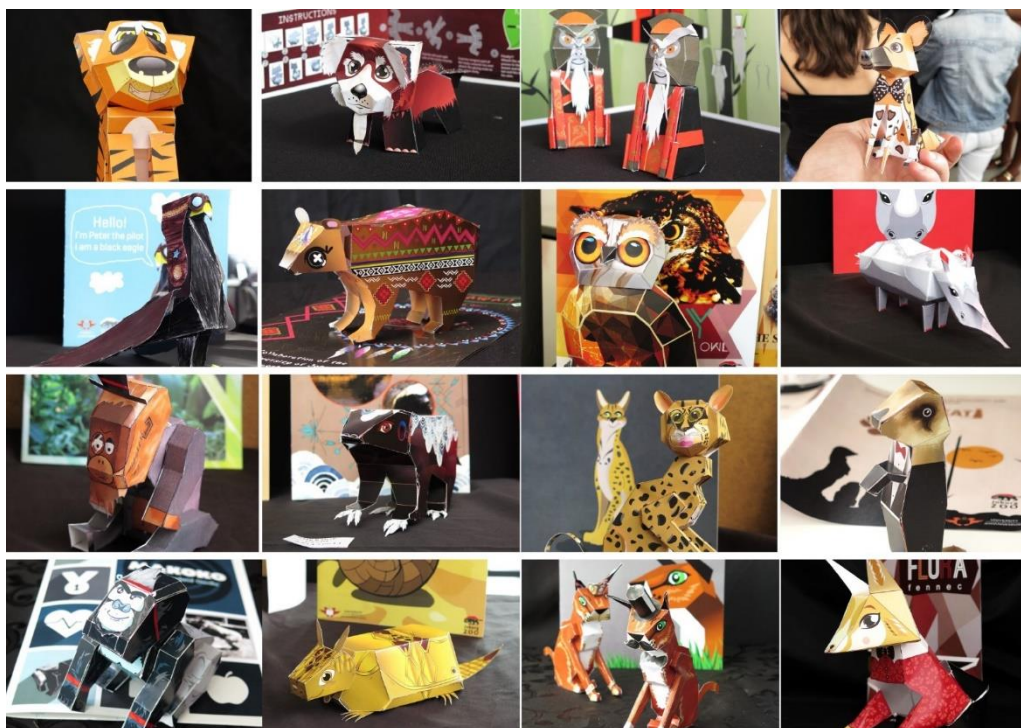


Figure 2: A few of the 2015 prototyped projects

2015–2017 outcomes

The project again fell short of a commercial standard due to overly complex original die-cuts (Figure 2). The project provided lecturers with a database of original die-cuts that could be adjusted and improved. Thus, in 2016, honours student assistants created a set template for the various animal die-cuts. In 2017, a different group of GD honours assistants created original artwork for the A3 booklet covers (Figure 3). These adjusted designs changed the project's trajectory in line with what the Paper Toys project required for implementation.



Figure 3: Diverse cover designs ranging from 2017 to 2019

2018 design challenge

In 2018, the collaboration was officially revived as a part of the Honours Participation Design Unit. The Johannesburg Zoo stakeholders and lecturers recommended that more experienced, mature students solve the templates' uniformity issue and create a stronger visual style.

2018 engagement strategy

In 2018, honours students were taught DT and PD methods with visual examples from previous PD projects. After the presentations, students met the stakeholders, having only one student pair with the Johannesburg Zoo. The student conducted a site visit, interviewed Education Centre staff, observed animals around the zoo and started prototyping. After the initial client contact, students had to complete a four-week course with a design-thinking specialist, focusing on their PD stakeholders.

2018 design strategy

The honours student refined the five most viable templates. The project was rebranded as the Zoo Buddies campaign by creating the umbrella Zoo Buddies logo. The project received greater momentum when the teaching unit timeframe was increased from three to nine weeks, giving the students more time to test and refine the project, consult directly with the stakeholders, and work on extra campaign elements. The student could focus more on creativity within the DT framework, thus improving the templates' character designs and overall desirability.

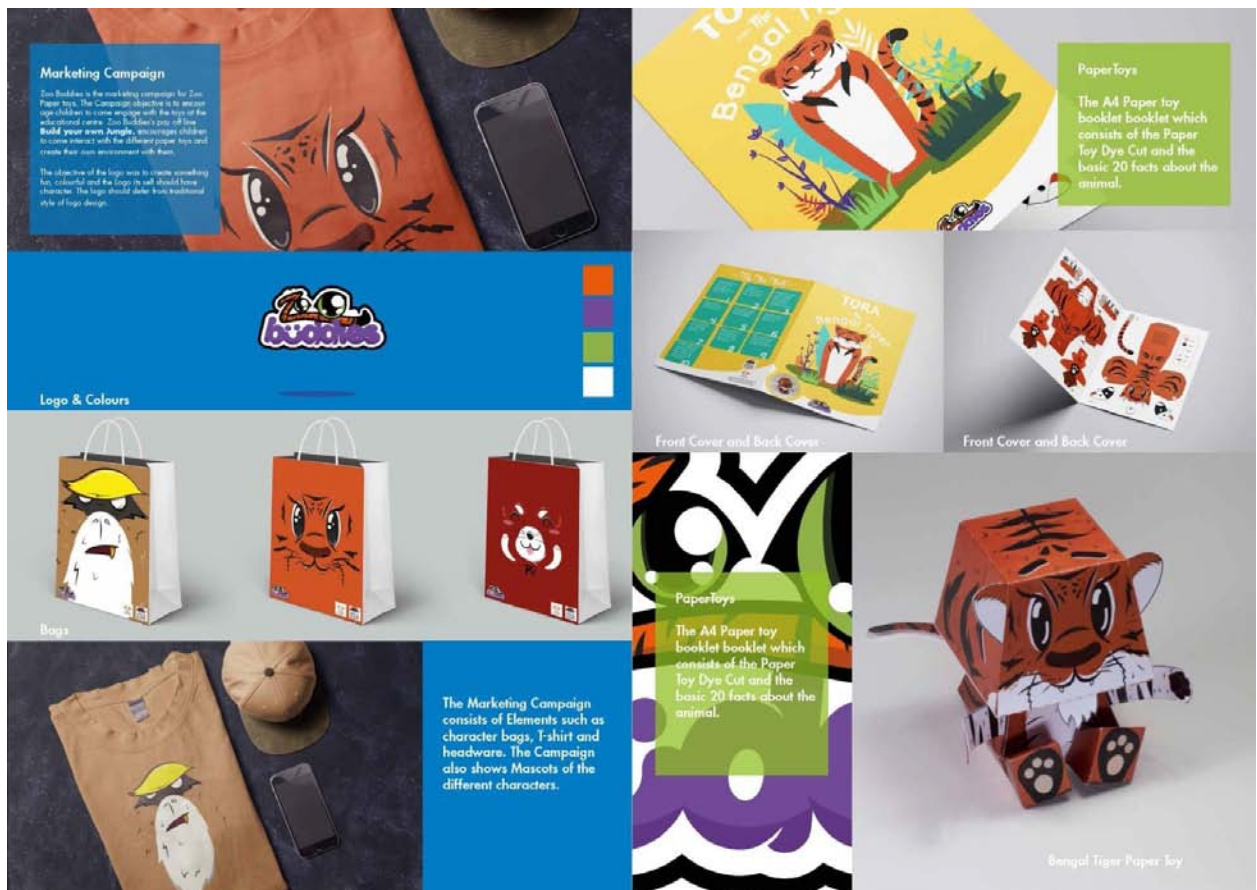


Figure 4: Excerpts from the 2018 campaign

2018 outcomes

The 2018 outcomes appeared ready for the stakeholders to implement with the visitors coming to the Zoo (Figure 4). However, due to the number of templates, the student had only created and refined five prototypes, which were too few for a campaign. The refined project also fostered a renewed drive for collaboration between UJ GD and the Zoo, leading to a second series of more diverse PD projects in 2019, moving away from a 'new' project to projects that offered support within the Zoo's existing structures. Projects included marketing the zoo's 115th birthday, a billboard (implemented), signage, mural designs, and a concept of a new Zoo club for children. During 2019, outside the UJ GD PD unit, three student assistants reviewed, built, refined and photographed 15 shortlisted template designs for the Paper Toy project. Lecturers edited and reviewed the facts per animal for the back covers of the templates.

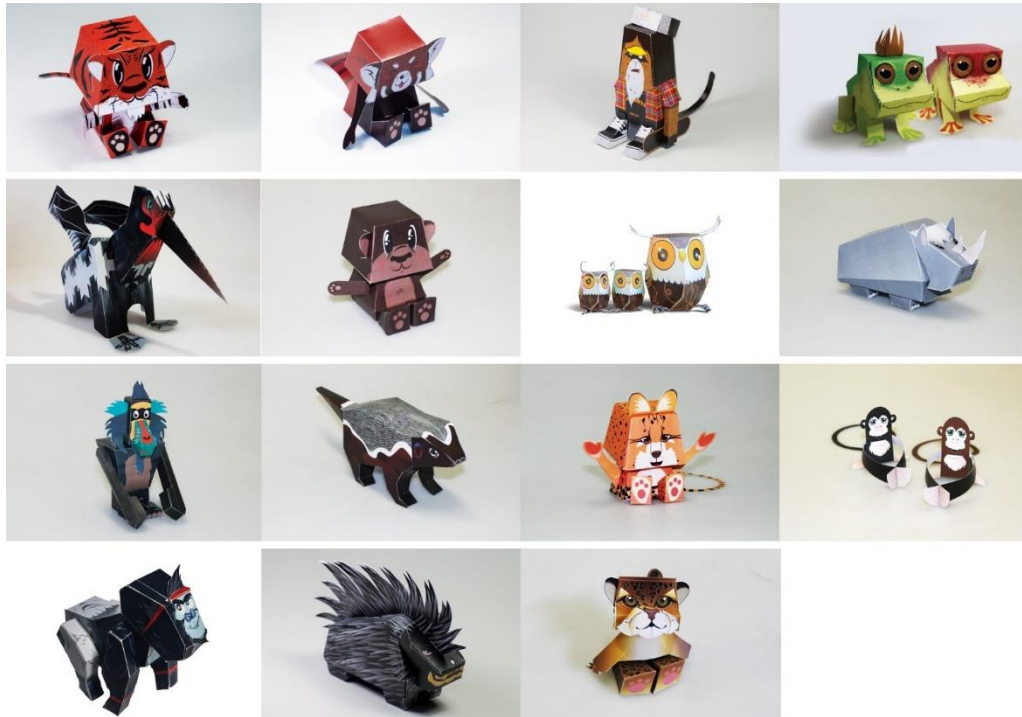


Figure 5: The final top 15 paper toys

Finally, at the end of 2019, the project received sponsorship from Johannesburg City Parks to be printed (Figure 5). In March 2020, utilising the 2018 Zoo Buddies campaign, the Johannesburg Zoo Education Centre launched the final set of 15 paper toys for sale at the Zoo's gift shop to celebrate the 115th birthday. All proceeds would go towards renovating the Edu-centre based on designs created by 2019 honours students and a parallel 2019 project that UJ Department of Interior Design had run. The Zoo Buddies launch was on Friday, 13 March, at the Zoo. Less than a week later, South Africa entered lockdown in an unprecedented and unexpected move. After almost ten years of work, the project's success appeared to yet again seemed to be beyond reach.

During the 2020 Lockdown, the Zoo's marketing team published two templates on their social media channels for children to print and build at home. All 15 templates were entered into the 2020 Loeries by UJ GD, for which the campaign won a bronze award. The boxes of printed templates were distributed to visiting schools, free of cost, with the permission of Johannesburg City Parks. Whilst this was not the intended purpose, the project did continue to keep the spotlight on the Education Centre.

2022 design challenge

In 2022, after two years of hiatus, the collaboration with the Zoo was revived. In 2022, the Education Centre briefed students on four initiatives they wished to collaborate on. The main project was revamping the Education Centre's interior through vinyl mural designs. The other three projects were Selfie murals throughout the Zoo, a Wayfinding and Events App and Educational murals and wayfinding designs for the Zoo's Temple of the Ancients.

2022 engagement strategy

Following the 2020 and 2021 lockdown hiatus, the PD unit was reduced to five weeks, with the Design Thinking unit preceding the project on an unrelated topic. In 2022, new industry specialists were

introduced into the overall project to ensure final projects were ready for implementation. The timeframe was shortened, however, the outcomes were improved due to the specialist's input.

Since 2022, the Participation Design Unit has been divided into five interconnected phases/weeks, following a modified Design Thinking Model, with one phase added at the start and two phases at the end to help establish positive relationships and assist stakeholders with implementation after the 5-week project. The Participation Design method is used throughout each stage to reflect on findings and inform decision-making. Each stage is linked to a week in the unit, with a specific goal to complete for the overall project. These stages are outlined below.

The 2022 Honours Participation Design Project structure

Stage 0: Lecturer process

The initial step in the project involves numerous consultations with stakeholders by the facilitator, utilising global HCD agency IDEO's Design Thinking, methods that ascertain a basic set of needs. Stage 0 can be defined as 'pre-design', or the "fuzzy front end" of the project (Sanders & Stappers 2008, p. 6). This stage involves various interviews and site visits by the facilitator with stakeholders that will assist students with the relevant data required for Stage 1. Stage 0 was added five years into the project to help encourage more in-depth analysis and relevance for the projects to get greater clarity on the stakeholder's needs.

Stage 1: Empathise

The first PD workshop is held in class, with all participants and stakeholders in the same venue. Thereafter, formal stakeholder consultations occur online to accommodate stakeholder schedules. All online sessions are recorded and transcribed for reflective guideline purposes. Students then continue with informal consultations beyond the official online consultations throughout the design process.

In this first official session, the stakeholders, in this case, the Zoo Edu-centre management, introduce themselves to students, brief them on their projects and requirements, and help them understand the needs of the various projects. After the presentations, students pick a project to partner with. When a project proves too popular, students must pitch themselves and debate as to why they are the best choice to assist the stakeholder. The class then votes on who is the best fit for the project.

Stage 2: Define

Students are divided into groups based on their stakeholders. Within these groups, students draft a list of questions regarding their project requirements for their stakeholders. In consultation with the facilitator, students discuss stakeholder needs and potential problems during this phase. After this session, students must conduct further research on their project through site visits, interviews and desktop research.

Stage 3: Ideate

Students present initial concepts and rough prototypes based on the stakeholder brief and email responses to the stakeholder, the lecturer and the class online for feedback. Students consult the facilitators during this stage to expand on their design strategies.

Stage 4: Prototype

During this phase, students refine their prototypes with the facilitator. The stakeholders are consulted where possible.

Stage 5: Test and feedback

An online, facilitated feedback session is held with stakeholders to gain insight into the appropriateness and feasibility of prototypes. These online interviews are recorded, transcribed, and made accessible to students and stakeholders to review the communicated information.

Stage 6: Refine for application and ideate on potential extra solutions.

After extensive stakeholder feedback, students consult, refine, and start to finalise their prototypes. Students then identify and develop a secondary design solution, if necessary, with Design Thinking methods to help stakeholders improve further aspects of their business/process during this phase.

Stage 7: Project handover for application and further refinement

During the final student phase, all projects are packaged in relevant formats for the stakeholders to use after the project ends. Students create finalised project summaries, reflections, and presentations during this phase. These summaries include all process work from the project, the primary sources where the data was obtained, and all other relevant information gathered from the workshop recordings.

Stage 8: Follow-up with stakeholders on project implementation (after the student project)

During this final stage, consultations with UJ's Intellectual Property Office take place to help implement the project. Stage 8 is often the more difficult stage, as problems with implementation beyond the scope of the PD unit are often identified. Implementation is more successful if the design solutions formats are designed to reproduce easily with minimal cost. In the case of the Zoo projects, this stage can be rewarding if design solutions receive sponsorship.

2022 design strategy

The project again followed a Design Thinking strategy. Students managed to do extensive site visits, consult with more stakeholders, and receive feedback on implementation from the printing and production industry. Although the project had been shortened, the outcome and quality remained consistent.

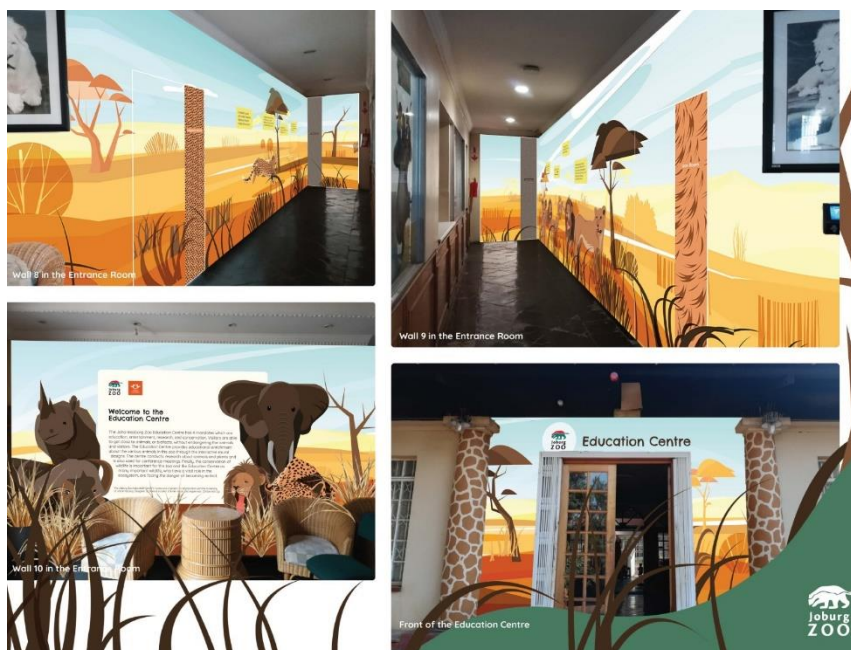


Figure 6: Excerpts from the Education Centre interior murals project 2022

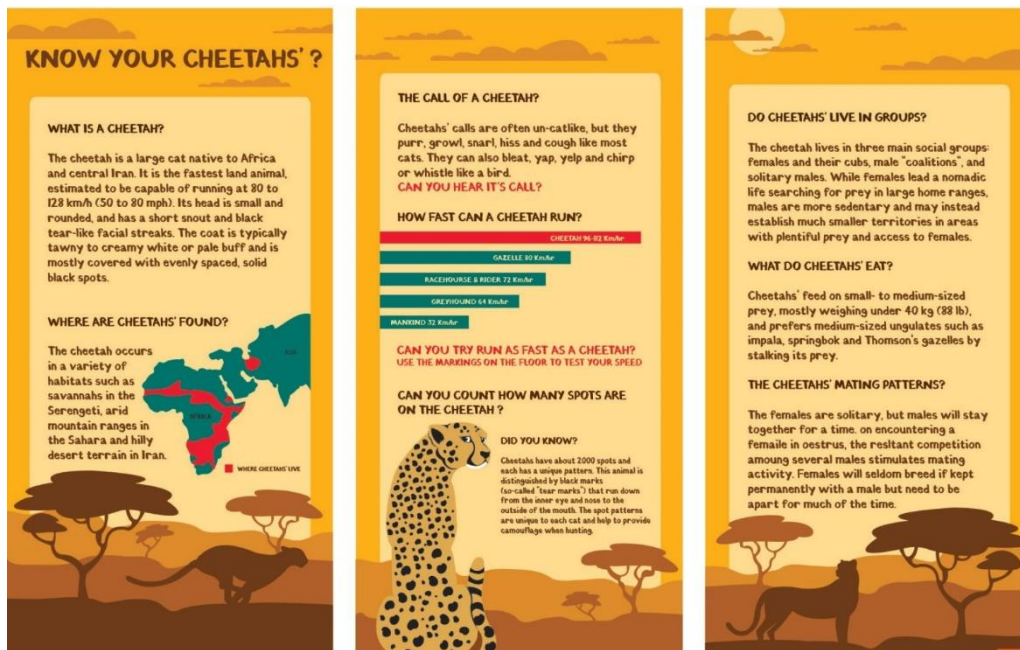


Figure 7: Excerpts from the Temple of the Ancients and Cheetah Fact Sheet Project 2022

2022 outcomes

One student designed the interiors for the Edu-centre with a Savannah implemented theme, based on the original names for the three main rooms of the centre (Figure 6). Other successful Honours Participation Design Projects for 2022 included an augmented reality wayfinding app, information boards by enclosures (Figure 7), interior murals for the Temple of the Ancients, and several selfie murals throughout the zoo.

Finally, in the middle of 2023, Zoo stakeholders confirmed that the building was in the process of getting refurbished. This project's successful concept and final discussion gave UJ GD, the stakeholders, and the students a more engaged opportunity in a real-world environment. Student success, assessment, and evaluation of the project depend on the choice of method and approach, idea integration and appropriateness, and personal style.

By applying an adjusted IDEO's HCD DT approach of discovery, interpretation, creativity, experimentation, and evolution, students managed to design appropriate work that met the needs of the zoo. As the facilitator, the stakeholders and the students moved through the different phases, reflection was encouraged and recorded in almost every project phase through feedback, discussion, and contemplation. According to Schon (1983), reflective praxis is part of the critical design process as students are encouraged to become reflective practitioners engaged in the outcomes within the project parameters.

According to Buchanan (1998), design ideas are at constant play and the pleasure that the paper toys brought to the children who visited the zoo played a big role in this project through the aesthetics and flow of experience as well as the knowledge fact sheet of the different animals. The students involved from 2011 to 2022 gained new confidence in their skills through these collaboration's various iterations, learning valuable lessons about professional practice and project implementation.

Student feedback from 2022

Student 1: "This project was an opportunity for me, as a student, to grow as a designer while helping develop the community of Johannesburg Zoo. This opportunity empowered students and the zoo because we contributed our knowledge and creativity to help the zoo [...] It made me work at my fullest potential at my current skill set, which was an eye opener".

Student 2: "I worked very well with the clients; they understood my vision, and I understood their needs. Feedback was a smooth process that I learnt to enjoy as it always bettered the refined artworks [...] I enjoyed the process of designing for children and adults from all walks of life with the intent to inform them of the beautiful animals we do not get to see every day".

Student 3: "Working with an external client allowed me to gain insight regarding clients within the 'real world' and how they may influence design outcomes. Working with external clients teaches students how to better engage with the project from an external, 'real life' perspective. This opportunity helps prepare one for the working world [...] Overall, I enjoyed the project and believe students should engage more in external projects to better prepare themselves as full-time designers".

Conclusion

Tertiary-based human-centred participation design projects such as the Johannesburg Zoo collaboration prove the importance and value of collaborative student-based design work. These projects boost student confidence, improve communities, and create positive change. The UJ GD PD unit applies Experiential Learning Theory by encouraging students to reflect on their actions and analyse their experiences and their positive impacts on the stakeholders (Kolb & Kolb 2008, p. 43). Due to the diverse projects within the UJ GD PD Unit, Constructivist Learning Theory practice becomes crucial to the project's success. Students engage directly through personal interaction, self-direct their projects within the various stages of the unit, and construct their own knowledge of the stakeholders to improve the success of the final design outcome (Chuang 2021, p. 6).

This project confirms the words of Robertson and Simonsen (2012, pp. 87-88): "When different voices are heard, understood and heeded in the design process, the results are more likely to be flexible and robust in use, accessible to more people, more easily appropriated into changing situations, and more adaptable to these situations over time".

In 2023, the collaboration continued with one student who designed an activity booklet for the Zoo Education Centre within the Participation Design Unit, which is being edited to pitch for possible funding. Many stakeholders have started utilising student projects because their implementation costs are feasible and minimal. Following the successful 2022 projects, the Johannesburg Zoo Education Centre is being upgraded and refurbished, with the support of the ongoing UJ GD PD projects highlighting the centre's value and potential impact on Johannesburg City Parks as the main sponsor. After the upgrade, the 2022 student mural designs will hopefully be transferred onto the walls. Due to the collaboration's continued success, this project's lifespan is now indefinite, and the successes have been evident.

The many years of engaging UJ GD students within this learning unit have given an overall sense of gratification, particularly when these ideas were implemented in the real world.

Please note: The author was given ethical clearance for this research project and all other Participation Design case studies from 2022 to 2024 by the Faculty of Education Research Ethics Committee. All

stakeholders have given clearance to list their names and agencies, and all student information has been kept anonymous. Ethical Clearance Number: Sem 1-2022-108.

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SESSION 6: Caring





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Higher education: Cultural agent to address consumer demand in the creative fashion economy

Elizabeth Kempen, University of South Africa

Abstract

Higher education institutions have an ever-increasing role to play in the creative economy of South Africa. The relationship between higher education institutions and the creative economy manifests through the skills, training, and knowledge transferred to students, thereby supporting this economy through job creation, addressing Sustainable Development Goal 8. The local fashion industry is a creative industry of which the custom-made fashion designer is essential. These designers offer locally made traditional and culturally specific custom-made garments to customers in South Africa that communicate the culturally significant heritage of their wearer. This is accomplished through incorporating African fabrics into Western designs or using cultural and symbolic attire created by traditional designers knowledgeable of the features synonymous with a specific cultural dress. Although various studies have signalled the importance of custom-made fashion designers in the alleviation of poverty and job creation, the significance of these businesses as cultural custodians of traditional apparel has not been considered. The purpose of this study was to explore the importance of culturally specific fashion to the South African female consumer who employs custom-made fashion designers to achieve a desired appearance and provide insight into the role higher education institutions can play in facilitating the advancement of traditional and cultural fashion to contribute to the creative economy. An exploratory qualitative study was designed, which included participants who made use of custom-made fashion designers. Data was gathered through 11 mini-focus groups, resulting in data saturation. Transcribed interviews were thematically analysed, and three main themes emerged from the data. The findings suggest that customers attribute the importance of custom-made culturally specific fashion: 1) to be culturally responsive to their traditions and culture, 2) as enablers of economic empowerment, and 3) indicative of their local favouritism towards locally produced custom-made fashion. Through the inputs of higher education institutions where fashion curriculum is taught within Fashion Design and Consumer Sciences programmes, training should focus on the importance of preserving cultural heritage in fashion design curriculums. Higher education institutions should further initiate and support the advancement of basic sewing and cultural fashion design skills to ensure the advancement of cultural custom-made fashion design in communities and to those who have not benefitted from fashion as a creative industry to improve livelihoods. The study contributes to the cultural importance of fashion and the role higher education institutions can play in advancing the creative fashion economy of South Africa and addressing Sustainable Development Goal 8.

Keywords: Consumer Science, creative economy, creative industry, custom-made apparel, entrepreneurs, fashion design.

Introduction

Globally, higher education institutions' involvement in the creative industry (Lazzaro 2021) through intellectual agency and active participation in the implementation and development of creative industry training and educational initiatives have become evident (Bilan et al. 2019). In South Africa, this involvement remains weak as the national innovation policy predominantly supports STEM (science, technology, engineering, and mathematics) skills development (Snowball, Tarentaal & Snapsed 2021). Therefore, the opportunity for higher education institutions to contribute to Sustainable Development Goal 8 related to decent work and economic growth through the development of creative industry skills may be lost due to this mindset.

Designer fashion has long been considered part of the creative Industry, where creativity emerges from the novel and inherently creative ideas (Matiza 2020) produced through creative human capabilities, skill sets, and talent, giving life to ideas such as tangible fashion items. The expression of creativity through the production and selling of small-scale fashion products makes these creators part of the creative economy. Yet very little attention is given to the need to advocate for, or the advancement of creative small-scale custom-made fashion design entrepreneurs who can produce custom-made fashion in South Africa through which to advance the creative industry.

Moreover, these industries can produce cultural products (Matiza 2020) through which the cultural importance of apparel and the use of traditional textiles creatively combined with current Western fashion trends can be sustained. Unfortunately, the contribution of custom-made fashion designers to the cultural significance of the South African fashion wearer has not received enough attention and is potentially undervalued. Mastamet-Mason, Müller, and Van der Merwe (2017) have also alluded to the dearth of research on African costumes and textiles from different cultures and the indigenous knowledge systems that accompany African cultural dress. In order to add to the gap in understanding the significance of African cultural fashion and the role it plays in the custom-made fashion industry, this study questions the role of the custom-made fashion designer in sustaining culturally specific custom-made fashion and the role higher education institutions should play in the advancement of the custom-made fashion designer of culturally specific custom-made fashion within the creative economy. For this study, culturally specific custom-made fashion refers to the use of African print fabric to create an individually designed fashion product of cultural or traditional significance as well as the design of heritage-specific dress of specific cultural groups such as Tsonga, Sepedi, and others from South Africa. This study contributes to a better understanding of the importance of culturally specific custom-made fashion as a creative industry and necessitates the urgency to support, value, and acknowledge culturally specific custom-made fashion as an industry in the creative economy of South Africa.

Literature

Creative economy and the creative industry

The creative economy is not yet exhaustively defined (Levickaitė 2011) and reflects the economic activities associated with the creative industry where new ideas, thoughts, and innovation are synonymous with this economy (Surodjo, Stuty & Lukman 2022). The creative economy is acknowledged as a dynamic sector in the economic development of developing countries and is thought to be the solution for economic and cultural growth in Africa (Comunian, Hracs & England 2021). This is because creative resources form part of this economy through which growth and development (Guilherme 2017), as well as cultural, societal, or educational value, is generated

(Comunian, Hrac & England 2021). Therefore, the creative economy is often associated with the inclusion of the cultural (industries associated with symbolic outputs such as fashion products of cultural significance) and creative industries (knowledge-based industries) (Snowball 2016). Guilherme (2017) refers to it as an “economy of abundance”, as creativity and knowledge contributing to this economy is inexhaustible. Through this economy, jobs are created that give rise to income-generation opportunities with the potential to address youth unemployment in South Africa (Snowball 2016) and provide income and employment for women from rural and metropolitan areas (Snowball & Mpuma 2021), thereby generating an additional income for financially strapped individuals or families.

As this economy covers a wide range of creative businesses and is inclusive of culturally creative enterprises (Comunian, Hrac & England 2021), to which culturally specific custom-made fashion can be added, it is instrumental in sustaining livelihoods and improving the well-being of many (Abisuga-Oyekunle & Sirayi 2018). It is important to acknowledge that the creative industry within the creative economy not only contributes to the economy of a country but is also significant in advancing culturally important heritage within the creative economy. This can lead to a novel approach to cultural entrepreneurship where “skilled cultural operators” can creatively use cultural resources, such as knowledge and skills, to design and produce culturally specific custom-made fashion, to advance the creative economy (Lounsbury et al. 2019). Thus, the creative becomes enshrined in the customs and symbolic nature of the traditions and culture of those who know of and apply the skills within this economy and the custodians of culturally significant items resulting from the creative ideas of actors, such as custom-made fashion designers, who contribute to this economy.

Importance of custom-made fashion designers

Custom-made fashion designers in South Africa have been featured as drivers of the informal economy in various papers by Kempen, Strydom and Tobias-Mamina (2021), Strydom, Kempen and Tselepis (2022), and Maliwichi, Manenzhe-Tamarope and Strydom (2023). In many instances, these designers happen to stumble upon the custom-made fashion industry by chance, through need (Kempen & Cornelissen 2023), or spurred on by the many retrenchments in the South African clothing manufacturing industry (Rogerson 2000). However, their role in the creative economy and creative industry has not been acknowledged for the contribution they make to sustain and advance culturally specific custom-made fashion within these informal business contexts. Much of the culturally specific custom-made fashion is designed and delivered to customers requiring unique, individual, purpose-specific cultural fashion items. From a cultural perspective, these custom-made fashion designers bring about the revival of local textile traditions and artisanship (Langevang 2017). The potential of custom-made fashion designers to advance cultural heritage through culturally specific custom-made fashion cannot be ignored, as it can give rise to the creation of cultural entrepreneurship within the creative economy in Africa. This stems from the creative economy being considered an expansion of the cultural economy inclusive of culturally based sectors such as the fashion industry (Guilherme 2017). Irrespective of the potential of the custom-made fashion designer industry in South Africa, it will not have an impact if the value and contribution of this creative industry are not recognised and addressed. It is here where the role of the higher education institutions comes into play.

Cultural contribution of custom-made fashion designers

Africa is known for local dressmaking artisans developing African fashion through traditional know-how, during which local trends are creatively captured and preserved (Bello 2019). Clothing has long been considered the cultural communication mechanism of its wearers. In so doing, the cultural distinctiveness of the identity of the society is represented through the creative and artistic way in

which clothing is designed and worn (Adade 2023). As a result, clothing captures the cultural values, ideologies, customs, beliefs, and many other aspects that give meaning to society (Anyanwu & Chiana 2022) and visually represents the culture as a shared meaning of society. Custom-made fashion designers are creative artisans who can give life to cultural fashion thereby becoming the custodians of the cultural heritage of their customers. Cultural dress is specific to a cultural group in South Africa, such as Tsonga, Sepedi, and many other cultural groups that have prominent cultural dress elements that are used to depict their cultural appearance. In this way, through the design and production of culturally specific items, fashion is also given a cultural value (Abdullayeva 2022) that plays a significant role in ensuring the continuation of the cultural dress of various cultural groups. According to Darku and Akpan (2020), by producing cultural products of local relevance, such as culturally specific custom-made fashion, custom-made fashion designers from Africa can become globally and locally recognised, which may impact their future as custom-made fashion designers. Therefore, the importance of culturally specific custom-made fashion for the small-scale custom-made fashion designer should not be overlooked as it holds the key to the success of the creative economy in South Africa.

Higher education institutions in the creative industry

Gilmore and Comunian (2016) suggest that higher education institutions have found it difficult to define their role in the creative economy and the development of the creative industry. Higher education institutions can mould students to make necessary contributions to their local societies and economy through the creative subjects offered at higher education institutions (Comunian, Hrac & England 2021). These institutions are responsible for the intellectual development of the creative arts as much as it is responsible for the sciences by remaining responsive to the socio-economic advancement of the society they serve (Alemu 2018). However, the creative industry may be nested within specific fields at higher education institutions (Flew 2019), such as in a limited number of Consumer Sciences programmes in South Africa or limited to a few higher education institutions offering fashion design programmes. Yet there are higher education institutions where the creative industry is undervalued and as a result, fields such as fashion design, clothing-related, and apparel construction courses have been closed, thus derailing such contributions to the creative economy of South Africa.

Furthermore, higher education institutions are central to the knowledge economy of South Africa in how knowledge of relevance to economic growth is produced (Cloete, Maassen & Pillay 2017). As a result, the opportunity to engage in the development and support of sewing skills training to fashion design as a creative economy contributor should not be frowned upon by higher education institutions. The reason is that higher education institutions can play an all-important role in contributing towards Sustainable Development Goal 8 through the encouragement and enrolment of students in the creative industries and more so in the construction and development of fashion per se, as these can offer opportunities for future employment and job creation in South Africa. Higher education institutions can develop and release creative practitioners (Comunian, Gilmore & Jacobi 2015), such as custom-made fashion designers, that can serve a community or cultural group. The impact of higher education institutions at an economic and cultural level will be evident by becoming involved in fulfilling the mandate to be more socially and economically responsive (Lazzaro 2021; Cross & Ndofirepi 2016). Therefore, the influence of higher education institutions within an African context has become apparent (Comunian, Hrac & England 2021) as educational opportunities are needed to deliver more entrepreneurs for the creative industry (Abisuga-Oyekunle & Sirayi 2018), making the delivery of custom-made fashion designers, able to produce culturally specific custom-made fashion, even more important.

Methodology

An exploratory, descriptive qualitative study was designed to gain more insight into the importance of culturally specific custom-made fashion generated from custom-made fashion designers as viewed within an inductive approach to this study. Purposeful sampling, specific to exploratory, descriptive research (Sandelowski 2004), was used to recruit participants who made use of custom-made fashion designers as the only inclusion criteria for this study. For this study, this is a small-scale custom-made fashion designer that produces once-off culturally specific fashion commissioned for a special occasion or event. Convenience sampling was further used to recruit female participants employed at a university in South Africa who complied with the inclusion criteria.

Data collection was facilitated through small group focus groups, which provided an opportunity for participants to concurrently engage in discussing the commissioning of culturally specific custom-made fashion designed and produced by a custom-made fashion designer that would not be achieved without this group interaction (Doyle et al. 2020). Eleven digitally recorded group discussions, with between 2 and 4 participants, facilitated by an experienced moderator, resulted in 31 female participants participating in this study. Participants shared their experiences by addressing the question “*Why do you approach a personal fashion designer*”. Responses from the participants were further probed for clarity and explanation, resulting in group sessions of approximately 60 minutes. The sample size was determined through thematic saturation that allowed the researcher to develop conceptual categories until a detailed understanding of the ideas and thoughts regarding the commissioning of custom-made fashion designers for culturally specific custom-made fashion was achieved. The participants were between 18 and 65 years old, although age was not a criterion for study inclusion. Before data collection commenced, ethics clearance from the College of Agriculture and Environmental Sciences Health Research Ethics Committee (2018/CAES/114) was obtained.

Data were transcribed verbatim, after which inductive thematic analysis was performed, whereby an emic approach was used. In order to address the importance of rigour and quality in qualitative research, Johnson, Adkins and Chauvin’s (2020) trustworthiness criteria summarised by Nowell et al. (2017) were applied. Kempen, Strydom and Tobias-Mamina (2023) previously explained the use of these criteria for the broader study related to custom-made fashion designers, which applied to the data presented in this paper whereby *credibility* was achieved through prolonged engagement with the data and the participants in the study; peer *debriefing* during code generation; *member checking* during the focus group interviews; thick descriptive data obtained ensured *transferability*; through a logical, traceable, and documented research methodology, *dependability* was addressed, which contributed to the *confirmability* of the data; *authenticity* was achieved through audio recording and the verbatim transcription of the interviews with quotations specific to the responses of the participants as presented in the data.

Findings and discussion

The importance of culturally specific custom-made fashion designed and produced by custom-made fashion designers can be characterised in three ways: 1) responsiveness to the traditions and culture of the participants, 2) economic empowerment, and 3) locally produced fashion favouritism.



Figure 2: Stipe-like fabric for Venda traditional design (Design by Khosi Nkosi)

and grieving, thus signifying the role custom-made fashion plays during these events by using African print fabric to feature current Western fashion trends.

The importance of designers who can work with this fabric emerged because *“some of them (referring to the designers) is better (than others) [...] some of this material (referring to African print) they have edges and I want somebody who is able to recognise this edge and know where to put it. I go for the guy (referring to a specific designer) because I know he will [...] know that this is an African print”*. Therefore, custom-made fashion designers who are *“good with the traditional material (referring to African print)”* are highly sought after and required to be competent in producing the designs suited for African print fabrics. Amankwah and Howard (2013) found that most African prints do not meet the requisite composition standards in fabric width and include pattern layouts and intricate motifs that pose challenges to garment designers when using these fabrics. Subsequently, custom-made fashion designers who are not familiar with African print fabric may disappoint customers who believe that *“because she (custom-made fashion designer) was using*

Responsiveness to the traditions and culture of the participants Custom-made fashion designers are typically approached for what participants referred to as *“traditional clothes”*, of which the design is about *“the fabric not necessarily that it’s the correct attire for a certain culture”*. Traditional designs feature *“African print [...] which is not traditional, but all of us, just love embracing that”*, where *“the tradition in the sense of fashion nowadays is just using African print in whatever style you want [...] it is not necessarily culturally correct”*. The African print fabric mentioned by the participants symbolises Africanness (Lasisi, Oridola & Oligbide 2022) as illustrated in Figure 1. African print is a 100% printed cotton fabric widely used in Africa, known to have African tribal-like signs, symbols, and motifs as communicating elements in the design and not socio-economically specific (Adeloye 2022). African print is used in designs for special occasions such as *“weddings, graduations, special parties where (there is a theme)”*. According to Lasisi, Oridola, and Oligbide (2022), clothing within the African context is used to honour through celebrating



Figure 1: African print material used in traditional design (Design by Khosi Nkosi)

that Botswana fabric (waxed texture) she's not well trained in it so she struggled" and as a result, customers would "rather go to somebody who knows". Custom-made fashion designers are also required to recognise the cultural significance of the fabric they are required to work with as "it is more about the fabric [...] the Vendas, they have the Muvenda which is very specific (a stripe-like fabric)" as indicated in Figure 2.

On the other hand, custom-made fashion designers are also picked for their skillset and artisanship of cultural-specific or heritage-specific fashion belonging to different cultural groups. In this regard, participants believed that "they were taught by somebody how to make that according to the culture, and they understand the cultural background of the different colours and why you should have certain colours". These designers show a sensitivity to the culture of the customer whom they are designing for and, therefore, "I go to her because I am Tswana Barolong, so she will have to not stray away from my culture [...] so she will say [...] I know you are a Tswana how about [...] and she will do this and that [...] because she is from the DRC". This sensitivity towards different cultures is important to participants because "we have the same fabric (referring to Africa print) but the way the clothes are made are different" for different cultural groups.

For example "Leteise (or Letoitse) is a fabric we use in Batswana tribe mostly for weddings" (Figure 3).



Figure 3: Example of Leteise (Design by Khosi Nkosi)



Figure 4: Example of a modern Makoti (Design by Khosi Nkosi)

Mukwevho and Khosa (2018) found that by wearing cultural attire, the self-image, confidence, self-worth, and dignity of Tsonga female youths resulted in social cohesion and cultural identity. This is confirmed by this participant who says "it represents you [...] It talks about the inner someone [...] and you feel content when wearing this". The importance of custom-made fashion designers who have become cultural designers gain a reputation through their skills, knowledge, and experience of the requirements for these designs "especially those Makoti outfits (Figure 4), I know she's the person to go to" because "If you want a

traditional outfit (referring to culturally specific dress) go to the person who sews the traditional outfit because, with our Xhosa outfit (Figure 4), you cannot go anywhere (meaning that not every designer can be used).

The specificity of the most experienced custom-made fashion designers seems to point to the areas known to be occupied by specific cultural groups and, therefore, "if I want a proper Xibelani (as indicated in Figure 5) is in the Tsonga tradition it's like a skirt [...] I would not go to anyone in Joburg I would actually prefer to go all the way to Limpopo to find people who have been doing it for years to get a proper one" because the authenticity of the craft is within the region of the culture and therefore "you go specifically to Venda, not people around Gauteng because they will never [...] they will do something fakey so



Figure 5: Example of traditional Xibelani (Design by Lotsha Onaka)

when you go to Venda you will find genuine cloth and also the design will be exactly as how Vendas are". Therefore custom-made fashion designers who are for example "specialised in Sepedi wear" play an important part in sustaining cultural fashion heritage. The affirmation of obtaining the correct cultural dress dispels some concerns expressed by Mukwevho and Khosa (2018) who found that some Tsonga youths are abandoning their customary dress for fashionable Western clothing. The consumer demand for culturally specific custom-made fashion is apparent. Custom-made fashion designers who can upskill themselves to deliver culturally specific custom-made fashion can play an important role in ensuring the future of culturally specific custom-made fashion in South Africa.

Economic empowerment

Although not broadly communicated, customers of custom-made fashion produced by local small-scale custom-made fashion designers, support these designers since it is a "little contribution that I am making to change the situation" of the designer. "By supporting them, you are putting food on the table [...], which is a nice thing to do" because for many of these custom-made fashion designers "it's survival". Emanating from this stance was "the reason why I support it (referring to locally produced fashion from a small-scale custom-made fashion designer) is job creation [...] that everything [...] done in the country which is job creation [...] also boosts the economy of the country". As a result, the commissioning of culturally specific custom-made fashion can ensure the economic empowerment of small-scale custom-made fashion designers, which can result in sustained income and a contribution to the creative economy. A creative economy is recognised as a job-creating industry that sustains the livelihoods and well-being of people (Abisuga-Oyekunle & Sirayi 2018).

When considering the entrepreneurial initiative of small-scale custom-made fashion designers to produce income-generation fashion the risk and perseverance of these designers are admirable because "your old designers most of them just came from home with a sewing machine and they taught themselves how to do it". Higher education institutions' instructional support in sewing and design skills can provide a foundation for prospective custom-made fashion designers on which to build a successful custom-made fashion business. The custom-made fashion business could benefit future generations because when "I think of the next generation [...] so the next child [...] can inherit it and make it better [...] it boosts the economy of the country". Customers' support given to the younger generation of custom-made fashion designers emerged as a conscious effort because "if I don't support the youngsters that are growing in the industry now, who would support them [...] so then they become good businesspeople also". The contrary also emerged where younger custom-made fashion designers were concerned because "sometimes you will go and support them (referring to the younger custom-made fashion designers) and then you'll be sorry. It's like they are doing ourselves a favour although we are doing them a favour". Creative industries are sensitive to economic changes (Snowball 2016) and, therefore, must ensure customer retention through an appropriate business ethic. Prospective custom-made fashion designers can benefit from higher education institutions' business management training, allowing custom-made fashion designers to manage the custom-made fashion business and its customers. The findings suggest that customers of custom-made fashion designers are aware of the role they play in the economic development of these designers. Higher education institutions' support for custom-made fashion designers will allow better business acumen with which to build the creative economy.

Locally produced fashion favouritism

The support of custom-made fashion designers was further embedded in the understanding that the items produced by custom-made fashion designers were locally produced and, therefore, a proudly South African product. Favouritism in terms of locally produced custom-made fashion was found in

words such as “*I love to support the country*”, “*this designer is South African [...] just to support*”, “*we are supporting our fellow South Africans and designers*”, “*it’s a plus for me*”, “*a plus factor*” which made them “*very proud*”. The continued support of custom-made fashion designers is linked to a consciousness of the contribution to the local economy as “*it boosts the economy of the country, we don’t lose the value of our rand because [...] we create within*”. Therefore, the support of local small-scale custom-made fashion designers can have both a positive effect on the economy of the country and on the local custom-made fashion designer who benefits from the support of the local customer, thus becoming locally relevant to South Africa (Darku & Akpan 2020).

Conclusion

This study has contributed to furthering the importance of the creative economy in South Africa by focusing on the small-scale custom-made fashion designer who produces culturally specific custom-made fashion and how this creative industry can contribute to the creative economy. The importance of the custom-made fashion designer to produce culturally specific custom-made fashion is evident from this study as the Africanness of the heritage and tradition of specific cultures remains the driver towards culturally specific custom-made fashion. Higher education institutions should acknowledge the importance of training and providing educational opportunities for skills development in working with traditional fabrics and the design and production of specific cultural garments for various cultural groups. Not only should this be part of the fashion design curriculum, but further educational opportunities should be created for those with limited design and sewing skills. This will open many more opportunities for economic development stemming from the creative industry that has support from consumers who need culturally specific custom-made fashion. The creative economy can, therefore, make a much bigger contribution to job creation and poverty alleviation in South Africa if the importance of culturally specific custom-made fashion is acknowledged and supported by higher education institutions in South Africa.

Fashion design, including basic sewing skills in South Africa, should not be limited to degree programmes but extend to the potential small-scale custom-made fashion designer who can become part of the creative economy through the production of culturally specific custom-made fashion. If the potential to develop local small-scale custom-made fashion designers with limited skills is not encouraged to enter the creative industry, South Africa stands to lose the opportunity to address Sustainable Development Goal 8, which is about creating decent work and economic growth. It is the task of higher education institutions to encourage and engage with those who have been exposed to basic sewing and clothing design either through Consumer Studies offered at schools in South Africa or those taught basic skills through family members or parents to develop these skills for custom-made fashion design. In this way, higher education institutions can make a meaningful contribution to the creative economy of South Africa. Without the assistance and influence of higher education institutions to encourage the development of basic sewing skills, fashion design and its contribution to the creative economy, where it is most needed, will remain undervalued and unable to change the lives of potential custom-made fashion designers through culturally specific custom-made fashion. More research is needed to understand the pathway of custom-made fashion designers from secondary-level training to a career in custom-made fashion and culturally specific custom-made fashion.

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Enhancing awareness in interior design education: A life-centred approach to designing for ageing-in-place

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Abstract

By 2025, the number of older persons globally will surpass the number of young individuals (World Health Organization 2022). Research consistently highlights the preference for ageing in a familiar home environment, enabling the elderly to remain in their homes and avoid institutionalisation. In order to facilitate this, homes need to be adapted to cater to the changing physical and emotional needs of the elderly. Design professionals responsible for these adaptations are typically trained to address the functional requirements of the built environment. However, they may overlook the importance of a life-centred approach, which prioritises the long-term well-being of the users. This research aims to emphasise the interconnections between individuals and their environment, extending beyond the boundaries of the home.

A scoping review was conducted using a method that encompassed both conceptual and empirical literature on ageing-in-place (Pham et al. 2014). The keywords employed included ageing, housing, ageing-in-place, well-being, architecture, and home modification. The review primarily focused on peer-reviewed papers published between 2012 and 2022, with select seminal works beyond this time frame. In order to ensure interdisciplinary insights, literature from various academic disciplines was sourced.

The research delved into six themes to broaden the life-centred design approach for design educators and professionals. These themes encompassed: 1) physical well-being, 2) psychological well-being, 3) social engagement, 4) spatial/built structure, 5. the broader context of the neighbourhood, and the integration of 5) home technologies and AI. By considering these themes, new pathways for design professionals can be formulated, extending beyond the conventional approach of solely addressing compliance with disability or modification standards.

The proposed life-centred approach aims to sensitise design educators and students to the needs of future ageing populations. It offers design professionals a multidisciplinary body of knowledge that accommodates a holistic view of the challenges encountered during the process of 'ageing-in-place'. This work provides valuable insights for design students, architects, interior designers, and researchers. Furthermore, it identifies knowledge gaps that can be explored further, with the intention of impacting a broad range of stakeholders.

Keywords: Ageing, ageing-in-place, home modification, housing, well-being.

Introduction

The World Health Organization globally recognises ageing as a challenge (World Health Organization 2007) and "ageing-in-place" has emerged as a response to older individuals' desire to remain in familiar environments (De Decker et al. 2013; Iwarsson, Sixsmith & Wahl 2005). In this context, designers play a critical role in supporting the well-being of older individuals (Stevens, Petermans & Vanrie 2019; Harper 2013). Traditional research on residential environments for older individuals focuses on physical accessibility but overlooks psychological well-being (Wiles et al. 2012). Authors have identified that addressing the complex challenges of ageing requires interdisciplinary approaches and collaborative research to develop comprehensive design solutions (van der Elst 2022; Woolrych et al. 2020; Granbom et al. 2014).

Similarly, this trend is also noticed in Africa where significant growth in the proportion of older individuals is also becoming evident (Pillay & Maharaj 2013). Despite this, the interior design curriculum in South Africa pays little attention to inclusive design for ageing populations. Further research is needed to provide students and practitioners with a relevant conceptual framework for designing spaces that meet older adults' specific needs (Frochen & Pynoos 2017; Chrysikou, Rabnett & Tziraki 2016). In this paper, we explore literature in the field and identify challenges and needs for policy and developmental shifts, in addressing knowledge gaps in the field, and in turn in the design curriculum.

Method

For this review, a scoping method as described by (Pham et al. 2014) was employed. *The research question guiding this review was: How does current interdisciplinary literature inform a conceptual framework to sensitise design students and practitioners to a holistic view of ageing-in-place? A comprehensive search using academic databases and platforms such as Google Scholar, EBSCOhost, PubMed, ResearchGate, Academia.edu, Elsevier ScienceDirect, Sage Open, and Social Science was undertaken. The search keywords included ageing, housing, ageing-in-place, well-being, architecture, and home modification. The keywords "institutionalisation" or "institutionalised" were specifically excluded as we focused attention on ageing-in-place. The search resulted in 150 peer-reviewed articles identified as potentially relevant to the study.*

To further refine the selection, only articles published after 2012 in English were included. This process resulted in 58 highly relevant articles that describe approaches beyond the traditional focus on compliance with disability/modification standards or functional aspects of space. Seminal works were also included (Chaudbury & Oswald 2019; Iwarsson et al. 2005; Lawton 2001).

The selected articles, including a master's dissertation (Shiran 2019) and a doctoral thesis (Smetcoren 2015), were reviewed and analysed. The articles included in this review draw on interdisciplinary knowledge from environmental gerontology (Bigonnesse et al. 2014), Environmental Psychology (Raymond et al. 2023), Health Sciences (Sixsmith et al. 2014), architecture and urban planning (Gilroy 2018), Urban Sociology (van Hoof et al. 2001), Environmental Studies (van der Elst 2022), Health and Social Sciences (Iwarsson et al. 2005) Occupational Therapy (Aplin et al. 2013). and Interior Design (Govender & Dr Potter 2021; Johansson & Björklund 2015; Jivraj et al. 2014; Aplin, De Jonge & Gustafsson 2013).

The open-source software Lateral.io helped identify keywords from each source, as indicated in Figure 1, which is included below. By highlighting these keywords, we were able to sort the data and identify the six broad themes that are used to discuss the findings of the literature review. The multi-

disciplinary literature revealed three broad themes: 1) physical well-being, 2) psychological well-being, and 3) social engagement. The architectural and design literature contributed to identifying the remaining three themes: 4) spatial/built structure, the 5) broader context of the neighbourhood, and 6. Home technologies/AI home integration.

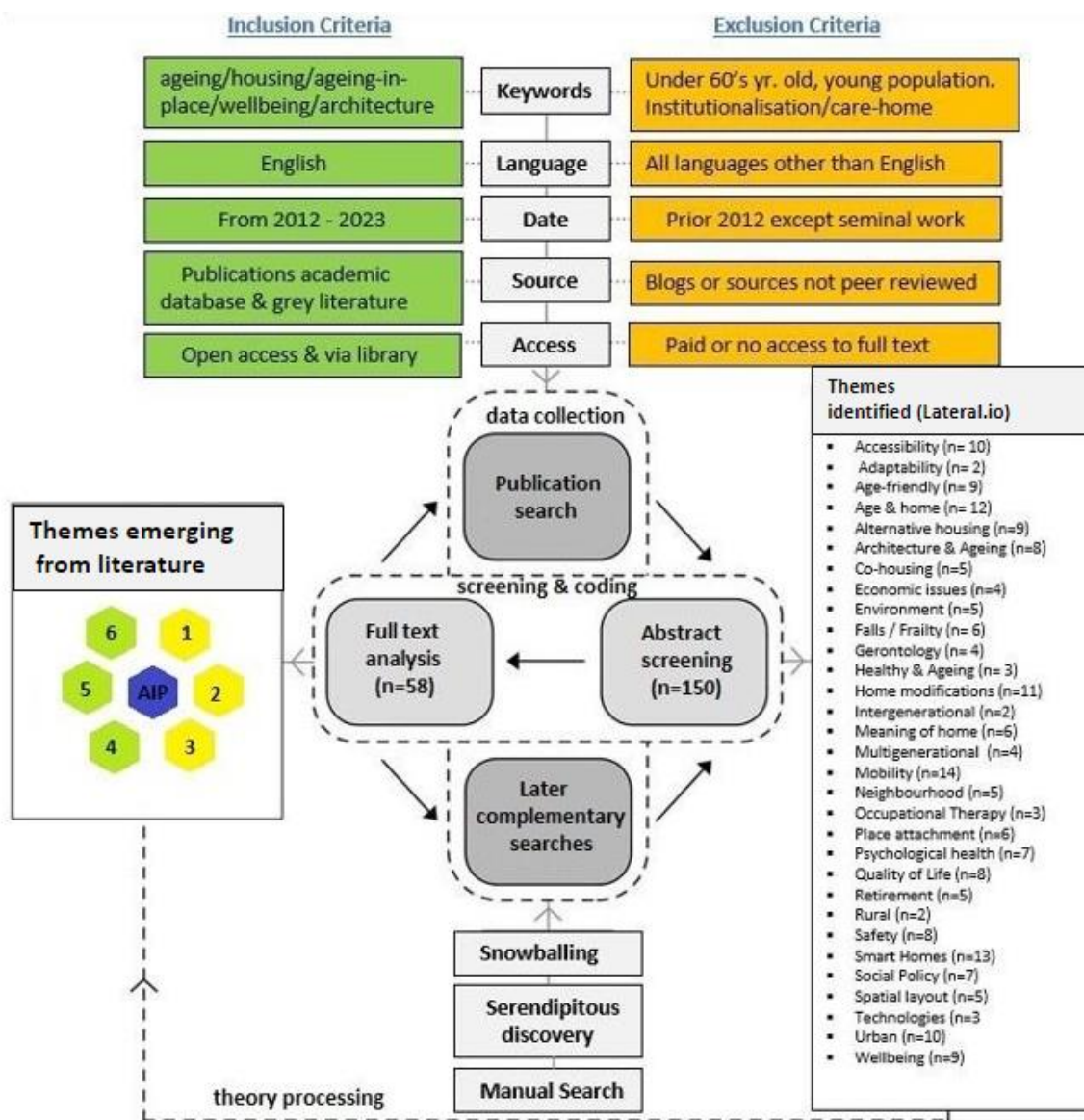


Figure 1: Overview of the literature review method (Authors 2023)

Theory

The theoretical Framework of Person-Environment Processes in Later Life, proposed by Chaudhury and Oswald (2019), is used for understanding the complex interplay between individuals and their environment in later adulthood (Figure 2). The framework is grounded in Lawton's (2001) Human Ecology Model, which emphasises the interrelatedness of different environmental factors such as the natural environment, human-constructed environment, and human-behavioural environment that impact individuals' quality of life.

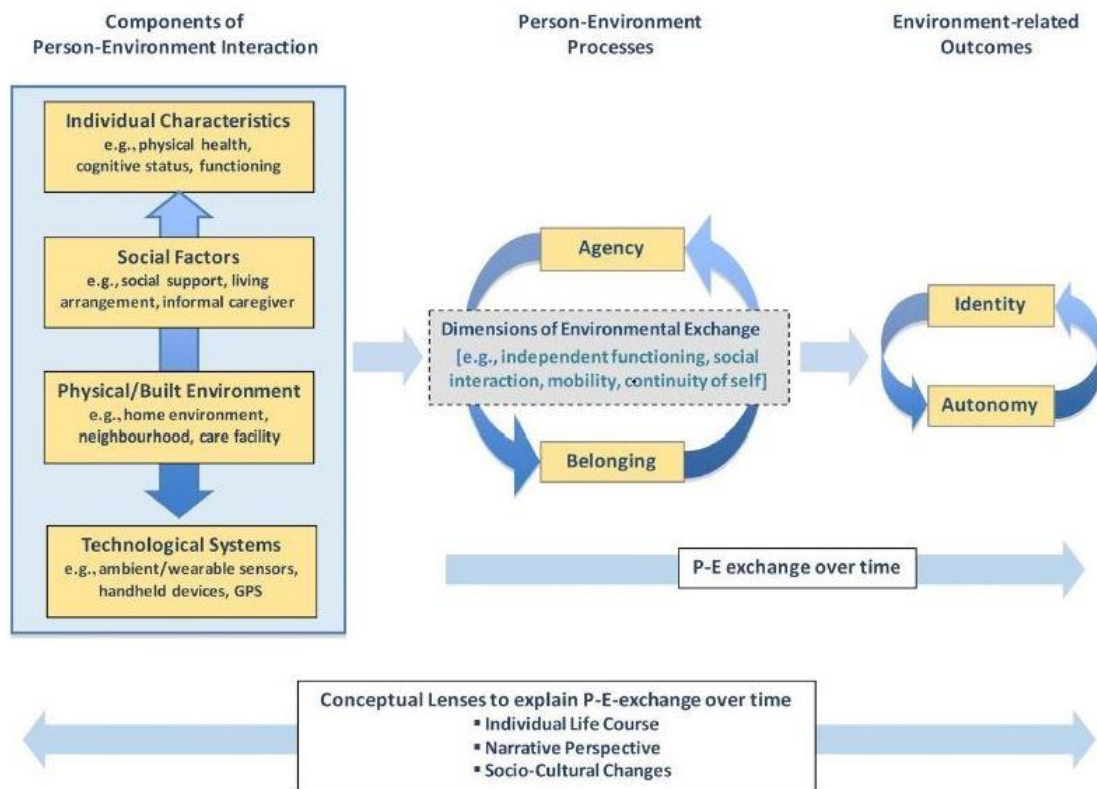


Figure 2: Person-environment exchange (Chaudhury & Oswald 2019)

The six identified themes from the literature offer a starting point for a conceptual framework towards designing for ageing in place. The literature from architecture and interior design are indicated in green and the interdisciplinary fields of sociology, gerontology, and environmental psychology are shown in yellow. The person-environment relationships change over time, and therefore, we have tried to include this changing interrelatedness using the grey arrows in the conceptual framework included in Figure 3 below.

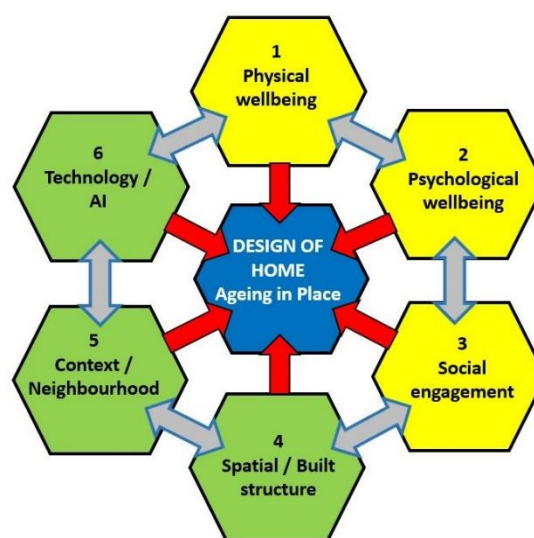


Figure 3: Towards a conceptual framework for designing for ageing in place (Authors 2023)

Findings

In this section, we provide an overview of the interdisciplinary literature reviewed according to the themes identified, although we have tried to avoid repetition, the findings are interrelated and there are overlaps in the findings across disciplines.

Physical well-being

A person's age relates to various lenses, such as chronological age, biological factors, and cognitive aspects. Assessing age-related issues is challenging due to the diversity within the elderly population, and the perception of "youth" or "ageing" is shaped by specific contexts. The heterogeneity within the target groups should be the primary consideration in the design process (Stevens, Petermans & Vanrie 2019).

The notion of home holds increasing significance for well-being in old age. Health deterioration occurs gradually between the age of sixty and eighty, known as the third age and becomes more extensive thereafter, in the fourth age (Jivraj et al. 2014). With declining physical and emotional abilities, older adults become more reliant on external assistance for daily tasks and may find themselves physically and mentally at the margins of being able to remain in their homes (Almevall et al. 2022).

The World Health Organization advocates for a life-course approach that promotes the concept of active-ageing by empowering elderly individuals and including them as an active collective in society (World Health Organization 2007). Daily activities encouraging movement are essential in helping older adults retain functional abilities. This is where architecture and interior design can play an important role in enabling the postponement of institutionalisation (Crews 2022; Bosch-Farré et al. 2020; García Lantarón 2016).

Carr et al. (2013) stress the importance of embracing the philosophy of universal design as a society where individuals can equally thrive regardless of ability or age (Figure 4, theme 1). Homes should embrace universal design principles, which automatically cater to ageing needs, yet private dwellings often lack mandatory accessibility regulations for older adults. Enhancing functional and physical health requires prioritising physical safety by assessing housing environments and actively learning how to shape and adapt the home environment for the health and safety of older adults (Frochen & Pynoos 2017). Concepts such as Lifetime Homes and Lifetime Neighbourhoods aim to improve the safety and accessibility of living spaces (Harper 2013).

The integration of health support devices and equipment in homes can be viewed negatively by some older adults, as these adaptations may compromise the home's aesthetics. Introducing features like grab bars can change how individuals feel about their homes and themselves. Occupational therapists and designers involved in home modifications should be aware of the significance of these aspects for clients and how they may impact their willingness to accept recommendations (Aplin, De Jonge & Gustafsson 2013). In order to introduce health aids that enhance physical functioning within the home in a non-invasive and subtle manner, designers need an understanding of the psychological well-being and identity of the elderly occupants.

Psychological well-being

The older adults' psychological and emotional well-being in-home interventions seldom receive consideration when spatial planning, functionality, and regulatory standards take precedence. However, "home" encompasses more than physical spaces, including the occupant's consciousness and self-awareness. A space becomes a place when individuals feel attached to it and imbue it meaningfully (Granbom et al. 2014). In the pursuit of remaking their homes, older adults seek to attach

meaning and enhance the feeling of belonging. The meaning of a place is an intermediate link between its physical quality and the strength of the emotional bond with it (Shiran 2019).

Personalising living spaces is important in enhancing place attachment. Assisting in enhancing place attachment through interior design facilitates the transition of older adults to new living environments. Personalisation establishes a positive relationship with one's home, reflecting personal dynamics, life events, values, tastes, memories, and more (Lies, Kang & Sample 2017).

As individuals age, the desire for autonomy and control over their environment becomes increasingly important. Lawton's work on "control centres" refers to favoured places within the home where older individuals maximise feelings of autonomy and control (Smetcoren 2015).

Factors contributing to the quality of life include social well-being, sense of belonging, participation in social activities, family or friendship networks, mental and psychological well-being, emotional health, self-esteem, and life acceptance (Vanleerberghe et al. 2017). In the process of adaptation or relocation, older individuals undergo a "remaking" of their homes, which can become increasingly challenging with age. Designers working in interdisciplinary teams are central to facilitating this process (Rowles, Perkinson & Barney 2016).

Ageing in place offers emotional and physical benefits; however, challenges associated with advanced age may make it difficult. Downsizing becomes necessary when individuals can no longer manage home modifications and maintenance. Alternative options, such as intergenerational households or communal arrangements, can support and alleviate isolation (Martin, Long & Kessler 2019).

Emotional and psychological well-being relates to social engagement. Developing an Active Ageing Framework within smart city initiatives promotes opportunities for older adults to continue participating in various aspects of life (del Barrio et al. 2018). By personalising spaces, enhancing place attachment, promoting autonomy, and fostering social engagement, interdisciplinary design teams create environments that support older adults' emotional and psychological well-being (Figure 4, theme 2).

Social engagement

The theme of "place" is more prominent in literature, with social networks recognised as significant factors in ageing in place (Pani-Harreman et al. 2021). Gardner discusses a "natural neighbourhood network" that considers proximity to neighbours, relationships with services, and chance encounters with strangers, all impacting well-being and social connectedness (Gardner 2011). Social contacts and relationships with neighbours strengthen social ties and support, contributing to the well-being of older individuals (Bigonnesse, Beaulieu & Garon 2014). Having guests, particularly family and grandchildren, is vital for the well-being of older people (Lies, Kang & Sample 2017), influencing their decision to age in place.

The social aspect of home design is essential for meeting the relational needs of older adults, including connections to family, community, animals, and personal belongings. The Quality of Life Manual (World Health Organization 2012) underscores the importance of companionship, love, and support in intimate relationships, encompassing the ability to love, be loved, and engage in emotional and physical intimacy. Achieving a balance between interior spaces that support intimacy and spaces that encourage social interaction becomes crucial.

The loss of a life partner can lead to feelings of isolation and loneliness, potentially triggering a need to relocate to a retirement home for safety and social interaction. A home can serve as either a "social

hub" or a "place of confinement" depending on the individual's circumstances (Almevall et al. 2022). Living expenses, maintenance costs, taxes, and levies can impact the affordability of living at home, potentially leading to confinement (Luciano et al. 2020). Severe functional dependency and the need for 24-hour care may ultimately influence the decision not to age at home (Iecovich 2014).

Beyond the traditional options of ageing in place or moving to a retirement home, there is a growing need for alternative forms of housing. The literature suggests other options, such as dividing one's home or finding "better alternatives" within the existing neighbourhood while promoting intergenerational social engagement (Shiran 2019; Arrigoitia, West & Peace 2018; Smetcoren 2015; Bigonnesse, Beaulieu & Garon 2014; De Decker et al. 2013). Design strategies are being sought to promote social interaction, foster intergenerational relationships, and create a home environment that enhances social engagement for older adults while supporting a sense of belonging and companionship.

Spatial/Built structure

Spatial requirements and built structures are essential considerations in architectural and interior design. Designers explore spatial organisation, design principles, and elements within the built environment. Included are aspects such as space planning, functional requirements, ergonomics, building materials, construction techniques, and the relationship between form and function. The built environment significantly impacts older people's behavioural and emotional functioning, affecting their health, well-being, and independence (Carnemolla 2018).

A home's spatial planning and the built structure play a crucial role in accommodating the ageing needs of elderly individuals. Designers should consider their ageing clients' health and physical abilities, including their sensory capabilities, temperature sensitivity, the fragility of the skin, visual and auditory impairments, and reduced sense of taste (Crews 2022). The design response needs to respond to the specific needs of elderly individuals, considering their physical limitations and sensory changes and how these may change over time.

Ageing in place should cater to a diverse range of clients with diverse cultural, social, religious, and financial requirements. The workforce is ageing and retiring later, resulting in a more generationally diverse population. Therefore, collective solutions cannot capture individual needs effectively. The need for alternative housing options beyond ageing in place or moving to a care home has emerged, including living independently, sheltered housing, kangaroo housing (accommodating two or more generations), and collective housing (Smetcoren 2015). These options cater to the varied preferences and circumstances of older individuals (Figure 4).

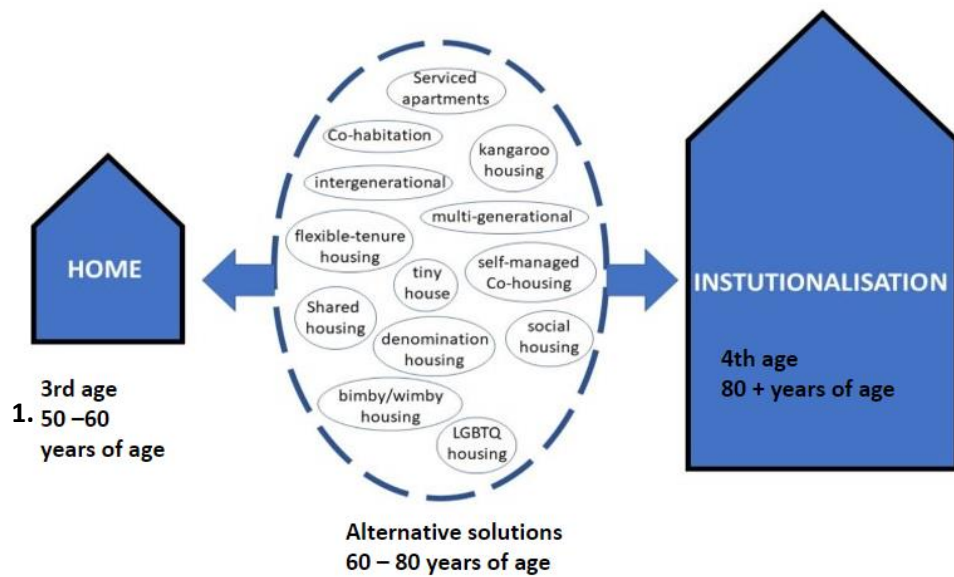


Figure 4: The need for alternative housing models (Authors 2023)

Multiple housing solutions, policies, programmes, and initiatives have emerged to support older adults' desire to age in place and meet their support needs (Greenfield 2012). However, ageing in place is not the best option for everyone. Some widowed, divorced, or never-married older individuals may prefer alternative housing options that provide a sense of community and social connection (Smetcoren 2015). Educating elders about their housing options and making alternative living arrangements more attractive can encourage them to consider novel solutions beyond ageing-in-place (Orfield 2013).

Adaptive and circular refurbishment scenarios can make existing housing suitable for ageing-in-place and align with the principles of adaptive reuse and sustainability. These interventions consider the specific obstacles and opportunities of everyone, such as their need for partial assistance, physical disabilities, income levels, and ownership or tenancy status (Montacchini, Tedesco & Savio 2022). Designing independent living spaces within a larger home allows for a multi-generational living while providing communal spaces that promote social relationships while maintaining freedom and intimacy (Gerards, De Ridder & De Bleeckere 2015). Flexible design principles that respond to social needs and economic feasibility can cater to younger and older populations (Malik & Mikolajczak 2019).

Designing homes that are responsive to the needs of older individuals can involve considering the concept of "lifetime homes" or "accessible for all" regulations, which ensure that homes can accommodate various life stages and accessibility needs (Smetcoren 2015). Universal design principles that focus on inclusivity and designing for all generations are essential in creating homes that enhance occupational performance and meet the needs of older individuals (Shin 2018). An educational process incorporating design research and the perceptual experiences of older residents can be valuable in understanding their needs and preferences (Stevens et al. 2019).

Overall, a home's design, spatial planning and built environment should meet the specific ageing needs of elderly individuals, including considerations for accessibility, adaptability, sensory experiences, social connectivity, and the diverse requirements of the ageing population. Providing a range of housing options that are well connected to social services and the community is essential for promoting the well-being and satisfaction of older individuals (WHO, n.d.).

Context/neighbourhood

When creating buildings and urban developments, designers analyse and respond to the surrounding context. Factors considered are site analysis, urban planning, cultural and historical context, sustainability, landscaping, and the influence of the built environment on the neighbourhood. Contact with nature plays a positive role in human well-being, supporting the importance of the neighbourhood context (Onay & Minucciani 2018).

When older people are ageing in place, the neighbourhood or the setting around their home supports their needs. The connection to the broader environment and the sense of belonging and enjoyment in a place are crucial factors that influence older individuals' quality of life and well-being (Vitman Schorr & Khalaila 2018). Access to nature is a predictor of well-being for older adults. Green spaces and other features such as housing quality, a sense of safety, and neighbourhood amenities contribute to a higher quality of life and can foster community attachment and enhance the sense of belonging. The proximity and frequency of use of green spaces are related to an individual's attachment to their neighbourhood, in addition, shared green spaces encourage social bonding between neighbours and contribute to a positive social setting (Shiran 2019).

Housing within the context of the broader neighbourhood is a collective consideration. Improving the quality of people's homes alone may only be effective if similar improvements occur in the neighbourhood. Accessibility and social cohesion are crucial factors influencing how older people experience their neighbourhoods (WHO, n.d.). For older adults with impaired senses or mobility, the built environment can significantly impact their vulnerability. Enhancements such as pedestrian accommodations, longer-timed crosswalks, smooth curb cuts, sturdy handles and railings, covered bus stop shelters, and well-designed transportation stops can improve the safety and accessibility of the neighbourhood (Finlay, Gaugler & Kane 2020).

Perceived accessibility and connection to place are positively associated with the quality of life of older individuals (Vitman Schorr & Khalaila 2018). As people age, their residential mobility tends to decrease, and they develop a stronger attachment and sense of belonging to their community (Iecovich 2014). Carefully selecting locations with clean environments, little noise, low crime rates, and good transportation connections can contribute to a supportive neighbourhood for older adults. The proximity of critical businesses such as doctors' offices, pharmacies, and social service agencies, as well as well-designed open spaces for physical activity, is important (Shin 2018).

The location of where people live and the ability of the environment to support their needs are critical considerations for public health and public policy (Yen & Anderson 2012). Forward planning and policies should aim to create age-friendly environments that support older individuals' social, physical, and emotional well-being. By considering these elements in the design and planning of neighbourhoods, policymakers and designers can create environments that promote older adults' well-being and social engagement.

Technology/AI

Integrating innovative home technologies and AI has recently gained attention. The literature explores home automation, Internet of Things (IoT) applications, AI-driven building management systems, energy efficiency, user experience, and technology integration into the design process. In an intelligent home, modification, customisation, minimal life interference, and extensible technologies to accommodate the ageing process are fundamental requirements (Ma, Guerra-Santin & Mohammadi 2022).

Smart home integration for ageing in place is an important area of exploration. Key considerations include ease of use, acceptance by older adults, privacy, and cost. The proposed framework encompasses interrelated aspects for a holistic design approach. AI, home integration, and IoT have the potential to support older adults in their homes, improving safety and independence, and providing personalised care.

Integrating AI and IoT technologies in smart homes can enable continuous and remote monitoring of patients, providing valuable health data for researchers and healthcare professionals (Engineer, Sternberg & Najafi 2018). These technologies can assist in the de-hospitalisation and home care of elderly individuals, allowing them to independently conduct activities related to their primary needs (Borelli et al. 2019). In-home sensors can facilitate ageing-in-place by providing alerts and notifications for early intervention and enabling routine monitoring, reducing direct care costs in the community. These technologies can also improve decision-making and enhance community healthcare services by collecting longitudinal health data (van Kasteren et al. 2017).

Access to technology plays a crucial role in enabling older adults with decreased mobility or social isolation to participate actively in society (Carnemolla 2018). Innovative home technologies, such as in-home sensors, can improve safety and reduce fall risks by implementing universal design, optional fittings, co-creation design, and intelligent technology. Fall detection sensors and automatic alarms can be beneficial in detecting dangerous situations and calling for help (Ma, Guerra-Santin & Mohammadi 2022).

However, technology-based research must include ethical considerations. Informed consent and clear communication about the capabilities and limitations of these technologies are essential to address concerns and manage expectations (van Kasteren et al. 2017). Involving the relatives of elderly individuals in the process can help mitigate misunderstandings and improve acceptance of these technologies (van Kasteren et al. 2017).

One specific area where technology can benefit older adults is temperature control. Elderly individuals are sensitive to temperature fluctuations, impacting their mobility and hygiene practices. Home temperature sensors can help maintain a comfortable and safe environment by ensuring appropriate temperature levels (van Kasteren et al. 2017).

AI, intelligent home integration, and IoT technologies offer significant potential in supporting older adults in ageing in place. These technologies can enhance safety, promote independence, and provide personalised care and assistance. However, addressing patient compliance, privacy and security concerns, and cost is essential to ensure the successful implementation and acceptance of these technologies. Addressing cost considerations by finding ways to make these technologies more affordable will be crucial in ensuring their accessibility and benefits for older adults (Luciano et al. 2020). By balancing the benefits and potential drawbacks, AI and home technologies can improve older individuals' quality of life and well-being as they age.

Conclusion

In response to the research question: How does current interdisciplinary literature inform a conceptual framework to sensitise design students and practitioners to a holistic view of ageing-in-place? The literature reviewed indicates that transdisciplinary collaboration allows for an integrated approach to addressing the multifaceted challenges older individuals face, ensuring informed decisions and effective implementation of design approaches. Collaboration between professionals, policymakers, and older individuals is necessary to bridge the gap between expectations and actual

needs (Heatwole Shank & Cutchin 2016). Designers play a central role in understanding user needs and considering demographic, societal, residential, and well-being challenges (Crews 2022).

In exploring life-centred approaches to designing for ageing in place we propose a theoretical framework for architecture and interior design students and practitioners to use as a prompt. Our findings highlight the need to address the limitations and gaps in current housing solutions that consider cultural appropriateness, affordability, adequacy, safety and security, accessibility, and availability and how these can change over time for vulnerable elderly citizens.

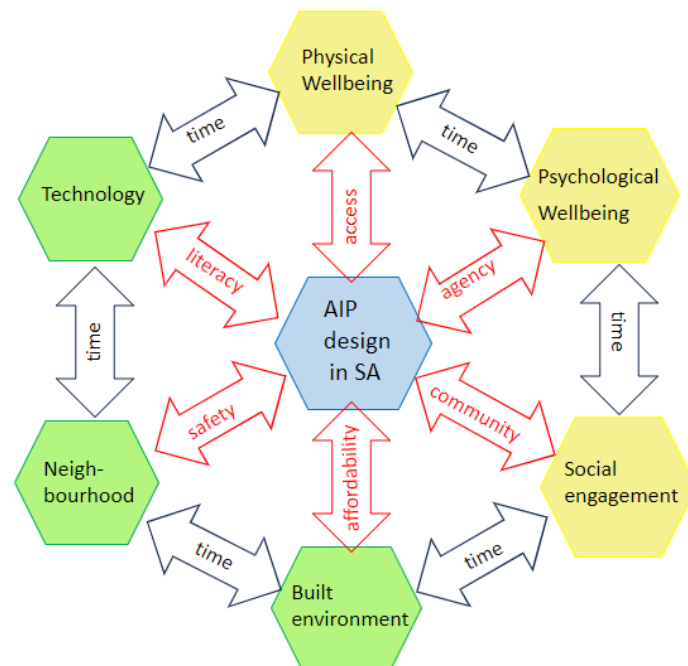


Figure 5. A South African approach to designing for ageing in place (Authors 2023)

The interrelatedness of the six key themes is central to the design of the home and the surrounding environment that supports ageing in place. Exploring alternative housing models while conducting in-depth research into South Africa's unique challenges, including transportation, poverty, security, and resource accessibility, is essential. The well-being and independence of older adults in the South African context must be safeguarded despite the hurdles posed by limited resources and inadequate infrastructure. The inclusion of stakeholders, including governmental policymakers, property developers, older people, and NGOs, is fundamental to successful design approaches.

Recommendations

Within the South African context, there is a need for up-to-date studies on ageing-in-place. By integrating age-friendly design principles into the South African Interior Design curriculum, we can improve usability and accessibility for diverse user groups. Continued research and collaboration are necessary to create supportive environments that enhance older individuals' well-being and quality of life (Crews 2022).

Incorporating inclusive design principles into the South African Interior Design curriculum is necessary as life expectancy increases. An experiential curriculum involving all economic sectors, including

governmental, private, and third-sector entities, is required for comprehensive education (Chrysikou, Rabnett & Tziraki 2016).

An effective way to cultivate student awareness of designing for diversity and inclusivity is through embodied, empathetic learning. Role-play activities using blindfolds, wheelchairs, and crutches, can enhance student empathy and deepen their understanding of the barriers faced by people with disabilities in the built environment (Rieger & Rolfe 2021).

It is essential to secure research funding and develop programmes that involve professionals from architecture, interior design, medicine, and planning, as well as incorporate the input of ageing individuals if a multidisciplinary collaboration approach intends to create a blended learning environment (Chrysikou, Rabnett & Tziraki 2016).

By integrating inclusive design principles into the South African Interior Design curriculum and embracing multidisciplinary approaches, we can effectively address the challenges of designing for ageing populations. These strategies enable design professionals to contribute to the creation of inclusive and age-friendly environments that prioritise the well-being and equality of all individuals, regardless of ability, or age, or geographical location (Carr et al. 2013).

Opportunities for further design research

- Exploring housing alternatives and raising awareness among older adults about available options.
- Practical and sustainable responses to budget constraints and the need for flexibility as needs change.
- Participatory design involving older adults and transdisciplinary research efforts with stakeholders to improve inclusivity and effectiveness of design approaches.
- Longitudinal studies incorporating pre and post-occupancy evaluations can provide valuable insights into the effectiveness of age-friendly design.

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SESSION 7: Doing





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Makers space/space making: Understanding the role of a MakersLab in fostering new creative pathways

Steffen Fischer, Greenside Design Center

Abstract

The MakersLab is a new creative space within a leading South African design education institution. The space encourages creative intersections to bridge the 4IR knowledge gap with sustainable development goals, 4IR and explorative making. Over the past year, the development and integration of the MakersLab have been integral in establishing educator/student relationships. The development of the MakersLab is seen as an 'incubator' for change whilst navigating current socio-economic and gender development gaps. Here, the space aims to foster user needs, develop new ways of thinking, and engage with the community. The fast development of technology means that educators learn from students as much as students learn from educators. The current design curriculum is changing to accommodate the changes with new machinery, technology, and modes of practice in design education. The curriculum within the interior design department is being interrogated to accommodate new technology to democratise learning with 4IR technology whilst navigating the parameters of online learning. The research uses a semi-structured questionnaire to understand the role and expectations of the MakerLab, together with educators, design students (first, second and third-year interior design students) and external creative artists. The development of the MakersLab provides innovative learnings to educators on how to better equip themselves with the fast-paced world of technology in making space for new pathways for future spatial designers.

Keywords: 4IR, democracy, design education, innovation, human capital, incubator.

Introduction

The purpose of this research study is to understand the functioning role of the MakersLab for design students and a broader artistic community in the context of innovation and transferable skills in fostering new pathways for making. How can a MakersLab role function as a space that fosters collaboration beyond the institution? The addition of a MakersLab within higher education spaces is an integrated approach to fostering new innovative pathways. These pathways are built to promote new ways of thinking and to provide creative approaches to learning through the act of making. MakersLabs, which often can be referred to as maker spaces, hacking spaces or fablabs are spaces that accommodate a variety of equipment such as laser cutting machines, 3D printers, electrical saws, projectors and much more. These differ from institutions depending of the desired needs and requirements that align with their curricula, however, at the core of these MakersLabs are educational functions that promote experimentation and making.

The Fourth Industrial Revolution (4IR) and the development of artificial intelligence (AI) are changing the approach in which MakersLab spaces are used. Though technologies are developing into newer modes of practice such as 3D printing with resins, powders and clay/concrete, the mode and practice of making remain the same. It is at the core of making that educators need to continue to promote experimentation, as within this lies the possibilities for social change and innovation (Smith 2017) to occur. As the world grapples with the advancement of new technologies and the growing fear of AI replacing the jobs of many, it is here where designers need the fundamental and necessary knowledge and skills to engage in society to become change makers.

The World Bank (2022) defines human capital as “the knowledge, skills, and health that people invest in and accumulate throughout their lives, enabling them to realise their potential as productive members of society”. The government is investing in Science, Technology, Engineering and Mathematics (STEM) and adding an “A” for art (STEAM) skills (BusinessTech 2022; Chibale 2022; Mail & Guardian 2022). Here, making can be viewed by maker communities and schools alike as a powerful vehicle for building up these skills whilst identifying the gap within youth development and unemployment (Statistics South Africa 2022). MakersLabs, therefore, have the opportunity to “contribute to South Africa’s shortfalls in areas of STEM[/STEAM] education, youth employment and enterprise development” (Armstrong et al. 2018, p. 38). Whilst MakersLabs are not a new model within the country, the development of 4IR and AI has seen a rise in new technologies, which are gaining momentum. These spaces have an obligation to establish young leaders in the creative fields to be at the forefront of learning and experimenting, therefore pushing innovation forward. Typically, MakersLabs situated within institutions do not provide services to the public. This paper negotiates how a MakersLab can be accessed by not only students within the institution but also the broader community. This discourse must change to foster access and establish a relationship with community members of all ages. As Capano (2023, p. 188) states, “Youth policies must be committed to the promotion of activities aimed at enhancing youth employability and social entrepreneurship through projects to develop skills, with a goal of enriching the territory’s human and social capital”. Enabling and equipping individuals for a 4IR world must be at the heart of all MakersLabs to foster collaboration both in the education realm and outside with community members. This symbiotic relationship will allow for overlapping ideas, engagement, and participation from these learning environments, promoting and carving a sustainable relationship for all with the backdrop of understanding entrepreneurship economies. South Africa is no stranger to an incredible mixture of language, indigenous knowledge systems, and identities. At these intersections, it is important to use this as a growing environment for carving new pathways in MakersLab spaces. Opening the MakersLab’s doors to a broader community promotes that the space becomes a democratic site for learning, an ‘agent of change’. This will have challenges as it means that the MakersLab will have to go through a process of transformation and tap into plausible business models to allow for regular maintenance and staffing of the equipment and machines. In order to situate this, there exists a number of studies where learning and guidance can be taken from, “studies of maker communities in South Africa, Egypt, Tunisia, and Morocco have found an ethos of open, collaborative innovation to be a central motivation for individuals’ participation in these communities” (Armstrong & De Beer 2021, p. 16).

Democratising the MakersLab enhances access and a healthy sustainable opportunity for community engagement. When asked what benefits are there for artists accessing the MakersLab Artist 01 mentioned, “More room for experimentation” and “Would benefit them [the artists] in the way that they have access to very expensive equipment which they might not have has access to previously”. Furthermore, the data shows (Armstrong et al. 2018) that gatekeeping MakersLabs creates a barrier and is counterproductive to the ethos of makers and designers in general, which as this paper argues,

should be collaborative in nature. It is worth observing that “Scholars have also noted that paying attention to histories of making activities and shared artisan workshops contribute more to our understanding of localised [...] innovation patterns” (Kohtala et al. 2020, p. 15).

Within this research, four participants from an artistic community were interviewed and participated in a making workshop using the laser-cutting machine in the MakersLab. This is to draw on the idea of scaling the MakersLab past the boundaries of the private institution and to observe the possible benefits of engaging with a broader community, “scaling is enhanced by its participation” (Armstrong & De Beer 2021, p. 12). Stimulating connections with other disciplines creates a space for leading innovation in the design field and fosters the crossover between various spaces in creating new ways of thinking and alternative approaches to current technologies. Making activities are crucial for the practice of the MakersLab, which turns the activity into a consumable and profitable avenue. The interpretation of the artist's response to how a MakersLab could enhance and elevate their practice, Artist 03 mentions, “The [MakersLab is an alternative] way of making prints that is unusual and can be a unique selling proposition. I can also see myself designing things to sell directly made with a 3D printer or laser cutter”. This new way of seeing how the same technology can have alternative ways of doing shows the level of creativity emerging from within this space. Artist 02 states, “The [MakersLab] processes help with productivity and can be used to create multiple pieces [in a short amount of time] that can be sold to benefit the artists”. Here, this nurtures and creates an interesting space for explorative processes and possibly more encounters for failures, which is where the real learning of making occurs, a space for promoting innovation and an opportunity for growing small businesses in an already exacerbated creative economy (Marwala, Tshilidzi 2019; Ndzuta 2021).

Methods

This research makes use of a qualitative research approach, a “form of inquiry support a way of looking at research that honours an inductive style, a focus on individual meaning, and the importance of reporting the complexity of a situation” (Creswell & Creswell 2018, p. 41). The research uses semi-structured interviews collecting data using an online capturing form, where data analysed can be coded and themed, here “the researcher keep[s] a focus on learning the meaning that the participants hold about the problem or issue, not the meaning that the researchers bring to the research or that writers express in the literature” (Creswell & Creswell 2018, p. 258). This research uses a transformative paradigm as its methodology as this paradigm “includes groups of researchers that are critical theorists; participatory action researchers; Marxists; feminists; racial and ethnic minorities; persons with disabilities; indigenous and postcolonial peoples; and members of the lesbian, gay, bisexual, transsexual, and queer communities” (Creswell & Creswell 2018. pp 46-47). This is particularly relevant in this body of research because it allows the alignment of issues that are addressed to provide clarity and foster empowerment amongst certain genders and individuals. This is necessary to provide advocacy and transformation in this particular MakersLab space that is participatory in nature. In order to study this, data is collected using a combination of narrative and phenomenological design approaches. Here, narrative research studies the lives of the participants and intersects this data with a phenomenological research inquiry that captures the essence of their lived experiences (Creswell 50). Being a genderqueer person, an academic and a designer focused on spatial thinking practices, this allows me to engage with vulnerable, varying genders, and sexual orientations together in tangent, as I have an awareness, although privileged, of lived experience in varying communities. This understanding allows participation in the lived experience of individuals who come from marginalised and minority backgrounds, which far exceed the materialities and intersections of race, gender, social backgrounds, sexual orientations and identities that traverse

spatial boundaries and borders, access and literacy, documented and undocumented in a sensitive manner. It is through my personal embodied non-binary ontological and epistemological approach that the “I”, the researcher, is engaged and participates with a level of self-reflexive observation.

Makers space/space making: Learnings

This paper draws on what it means to have a MakersLab that can be accessed by both the private institution it is situated within and what it would mean to allow for collaboration with the external community to promote creative new pathways for future designers/makers in a post-apartheid South Africa. In order to stimulate third site for learning and economic profit from the collaboration generated within these spaces, the research draws on existing literature and exemplary examples that a MakersLab can adopt. The success of making a MakersLab looks to the multiple voices and knowledge systems that make up the space. Understanding the possibility of scales and networks Nulli (2021, p. 68) mentions that “both the maker culture and schools are focused on knowledge, but they need to have more in common in order to build a connection”. Using the metaphor of an incubator, the MakersLab can centre itself as a source of knowledge production through teaching and learning, both in a symbiotic manner, whilst also reimagining material territories for sustainable futures for the advancement of culture and identity. This would also align with the government's call for action on STEM/STEAM learning and therefore should become one of the driving forces of the MakersLab. Employing a series of strategies to further develop youth empowerment should also be embedded in this trajectory (Capano 2023).

The COVID-19 pandemic illuminated many societal issues and the various lockdowns and restrictions to spaces meant that people began to hack, reinvent, and rebuild various appliances, and furniture through social media sites and online spaces. The literature on hacking has shown the ingenuity and innovative approaches in which people were engaging with their immediate environments around them (Green 2007; Kohtala et al. 2020; Platform 2020; Richterich 2020). The hacking that ensued created a transformative space and promoted the notion of democratising making across borders, genders, skills, and creativity. The hacking of environments proved to be a profitable alternative mode of income for some and pushed others into different career trajectories, ultimately changing the status quo and proving the economic capabilities of maker's spaces, spaces for making thereby fostering new creative pathways and open-source designs, accessible for all. Here, everyday objects were redesigned or rethought of or even mass-produced in instances where the lack of products was urgently needed in medical spaces (Richterich 2020). This seemingly new wave of making has created the necessary approach for both makers and educators in making space for interesting innovative designs. These designs are the heart of what it means to be a change-maker and or innovator in domesticated spaces. Carving a MakersLab space, which bridges the socio-economic divide, promotes access and therefore also fosters much-needed and meaningful collaborations between education spaces and the broader community, creating a maker's environment amongst spatial designers and artists.

Incubation: A site for learning

The MakersLab is a new addition to a single private institution and has had its doors open since early 2021. However, a space such as this requires additional resources to keep the MakersLab functioning. Staffing is a key point to having a successful MakersLab with open access at all times. Currently, the main challenge is accessing the space at any given time, yet students see the MakersLab as being a space to test and experiment in. Whilst the lack of a full-time MakersLab technician and enough contact with educators in the MakersLab is seen as something that must be improved. Be that as it may, students find the MakersLab to be a creative space where Student 04 remarks, “It's a space

where learners can make their ideas come to life". These comments have larger implications in the design process where prototypes can be created to aid the design thinking process of students. The prototyping is an integral design thinking process that leads to moments of innovation through the explorative nature, as Student 08 comments that the MakersLab, "allows individuals to play with different mediums more often because the equipment gives individuals time to explore their ideas". There exists a diverse history of making in South Africa, from handcrafted traditional domestic items to co-creating a variety of spaces from the informal to the formal. The geographies for collaboration and sharing knowledge systems to create innovative approaches to social design from a citizen approach are a means for a MakersLab of this nature to further develop and grow. As Richterich mentions, this can be viewed as 'critical making' (2020, p. 160). Similar to critical thinking, which is the synthesising and processing information and concepts, connecting-the-dots, critical making is as valuable to develop a material culture that engenders the diverse and rich cultural identities of a post-apartheid South Africa. As previously mentioned, hacking forms an integral part of a MakersLab narrative. Here students, staff and possible collaborators can co-create a making space where "hacking and making are about how practices of creation and transformation generate knowledge and influence institutions" (Hunsinger & Schrock 2016, p. 535). This hacking can further itself to online spaces, where the possibility of coding can plan an integral part of the MakersLab journey. New equipment and machines can be modified and 3D printed, and later coded for specific in-house uses.

The development of hacking again removes barriers to traditional learning methods and can "integrate across infrastructures, collaborative systems, socioeconomic divides, and international boundaries" (Hunsinger & Schrock 2016, p. 535). Artist 02 reiterates the powerful capacity of opening the MakersLab doors as an incubation tool for co-creation, "These technologies allow for a huge range of skills to be accessible for creative designers". The geographies of prototypes are at the core of critical making, which Artist 03 comments, "I like that I can experiment with materials and techniques". These prospective movements, "have specific histories, cultures, and traditions" (Hunsinger & Schrock 2016, p. 535), which should be illuminated and tapped into, which can further benefit students' approaches to design thinking and can be collaborative in nature with artists where teaching and learning can be facilitated by student, educator and artist. Further to these teaching the intersections of understanding creative economies to students will demystify the ambiguities in practice which are not formally taught in the curriculum. Both the artists and students' comments add value to understanding the new pathways of MakersLabs where experimentation is a core ingredient for success. The opportunity for the MakersLab to become a knowledge space, an archive which houses a material repository can produce exciting opportunities for new ways of thinking and understanding spatial discourses through creative and collaborative processes (Sjöholm 2018). In order to mitigate the lack of access to the MakersLab, the data indicates that students are eager to take ownership of the MakersLab and to be active agents of change that participate in the functioning of the MakersLab. This level of the agency requires current internal policies to be rethought to allow for positive and sustainable change to happen from a bottom-up approach, as Student 11 indicates, "If students were taught how to use the machines correctly so that they would be allowed to use the space without supervision and in their own time". These comments are insightful and should be taken seriously in order to reiterate that the MakersLab is seen as a democratic site of incubation and knowledge production.

Democratising making

The site of the MakersLab is positioned in a lively and community-driven area of Johannesburg with various other businesses, retail, and restaurants. This is an ideal pivotal location to be within, where opening the doors to collaboration would strengthen networks within the community and between

the institution, here “Making creates knowledge, builds environments and transforms lives” (Ingold 2013). As previously mentioned, fostering a space that promotes access to all will provide great learning between students, educators and the community. From a human-centred perspective Ingold (2013, p. 2) mentions, “we go to study *with* people. And we hope to learn *from* them”, promoting this democratic site for learning and transferring knowledge. This learning approach echoes the notion of the MakersLab acting as an incubator, where learning and the production of the making of ideas are developed in parallel or hand-in-hand between educators and students. This is “seen as beneficial” (Balkanska 2021, p. 402) and ultimately promotes a sense of democratic ownership amongst students. Student 26 recapitulates the necessity for the MakersLab to operate differently, “Allow for more frequent use of it, like perhaps allowing seniors [students] to use it without the required supervision of a lecturer [...] students [would] use the MakersLab more”. This data offers interesting data where students are showing a keen interest in the value of making and experimenting in such a space.

The democratisation of the MakersLab space can allow students to have a hand in its operation as well as the safety and training of more students who in turn can act as facilitators. This breaks down and demystifies the inner workings of the MakersLab, which some students have noted is scary and difficult to access or use. The spotlighting of areas which need further development in order for the MakersLab to be accessible to all, democratises making as a core function, and “a place for care” (Price & Hawkins 2018). The bureaucracy around accessing the MakersLab hinders this process of active engagement where Student 33 mentions, “Getting rid of the admin element of needing to send files to lecturer only for them not to be on campus or using the MakersLab at that moment”, indicates areas of improvement all around. Whilst educators continue to integrate making within the MakersLab in their curriculum, the limited capability of educators is holding students back. The importance of rescripting and fostering new pathways allows for smoother reciprocal geography of learning and engagement of educators and students where “the aim is to involve students in the production of knowledge and research, and discourage the passive accumulation of knowledge” (Balkanska 2021, p. 401).

We cannot make the future, however, without also thinking about it. What then is the relation between thinking and making? To this, the theorist and the craftsman would give different answers. It is not that the former only thinks and the latter only makes, but that the one *makes through thinking* and the other *thinks through making*. The theorist does his thinking in his head, and only then applies the forms of thought to the substance of the material world (Ingold 2013, p. 6).

MakersLabs are traditionally occupied by men (Cenere 2021), yet the data within this fieldwork tells a different story, partly because the interior design course is mostly enrolled with females. Out of the 40 participants, there were seven males and one genderqueer person, the remainder are all female. This data begs educators and makers to continue transforming these spaces into gender-diverse sites of innovation, a move from the traditional feminist ‘crafting’ often seen as ‘less worthy’ that encompasses crafting, textiles and weaving. Here, the MakersLab has the opportunity to tap into the rich and diverse indigenous knowledge systems within the country to inform innovative hybrid approaches to making. A democratic space for making in a post-apartheid South Africa. This research is conscious of the fact that “the underrepresentation of women in design” (Mosley & Bediako 2021, p. 117) continues to be prominent in the country and the broader Afrikan continent.

Discussion: Makers space/space making, a manifesto

Some remedies for the MakersLab moving forward are promoting and establishing best practices for all users of the space whilst illuminating the formal and informal harmful operational binaries that

privilege and divide. Therefore, making space and opportunities for failures and nurturing innovation. Creating a safe space for students to feel confident in utilising the MakersLab and its equipment. Disrupt current processes in order to make the MakersLab democratically accessible. Reinvent and forge pathways with artists/designers and the broader community to foster collaborative networks and engagements to bring about chances for innovation. This will ultimately create the much-needed human capital and social sustainability within the maker domains. The government and the World Bank (2022) have mentioned that “Investing in people [...] to develop human capital is key to ending extreme poverty and creating more inclusive societies”. Drawing on the data within this research, Nulli (2021, p. 71) reiterates, “building a [MakersLab] is the sort of economic investment that causes the kind of disruption that leads to more stable long-term change”. Gatekeeping is a valuable resource and does no justice, whilst beginning to navigate how making space to a new pathway for space making is critical to furthering the learning, participation and engagement amongst those who use it.

Conclusion

In this research, the MakersLab is a source of learning and understanding how new pathways can be forged in tandem with students, educators, and the community. This research is important because it outlines how a space of this nature can be used to foster collaboration rather than inclusivity. In this approach, it can attempt to bridge many social development gaps, promoting ideas of human capital and much-needed youth empowerment in the country. This aligns itself with calls from the government, which is an integral part of promoting economic change, where *vuli ndlela* (a Xhosa word for ‘making way’) for new pathways for future young leaders promoting 4IR and the act of making. This is critical to transform our current educational geographies in post-apartheid South Africa.

When posing the question of whether MakersLab’s should open its doors past that of the institution, the answers were all yes; “Yes, there are lots of people whose inventiveness will blossom when they see what they can do with these machines” says Artist 03 and “Yes. We [artists and designers] should nurture and encourage creativity and design in all our communities”, says Artist 02. The innovation in different disciplines can support artists and designers in scaling their practices and expanding their scope of experiments whilst cultivating productive networks where the MakersLab can be seen as a key resource. Therefore, developing human capital and increasing capacity to promote and carve a space for innovation, an incubator for explorative making, hacking, and development. Ensuring that the MakersLab opens its doors, both internally and to the broader community, will democratise the space and promote the metaphor of the incubator, a site and intersection for knowledge production, learning and material territories. This will ensure that the MakersLab is not gate kept but rather valued as a resource for experimentation and collaboration for social development. Furthermore, giving the ‘keys’ to the students and providing them with ownership will further facilitate this democratic move in fostering new sustainable pathways of doing in an education and institutional setting where educators learn as much from their students as vice versa. Perhaps at the very core of this transformation is further elaborating on the idea of hacking the MakersLab space, which engenders indigenous knowledge systems, creativity, and skills, altering the status quo of traditional learning practices.

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Conflicts of interest

The author declares no conflict of interest.

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Vulindlela – making new pathways

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Physical meets digital: Advancing industrial design higher education through the incorporation of projection-mapping in undergraduate teaching and learning

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Abstract

As emerging digital technologies become increasingly integrated into our everyday lives, it is important to evaluate how they can be used both as beneficial tools in the design process and how they can be effectively integrated into higher education pedagogy to enhance teaching and learning processes. As we enter the fast-changing Industry 4.0, students must be suitably and sufficiently equipped with a wide range of skills that Industry 4.0 requires. This includes the “hard skills” of practically using emerging digital technologies, as well as the “soft skills” required to effectively apply these technologies in sustainable and ethical ways. Consideration for how technology can be integrated into undergraduate teaching and learning advances programme offerings by equipping graduates with the skills necessary to participate in their evolving industry.

Projection mapping, also known as spatial augmented reality, is the process of superimposing digital images or videos onto 3D surfaces through digital projection. These surfaces can range from large objects such as building facades, to small-scale everyday products. The advancements of projection mapping present exciting possibilities in design processes and outcomes, such as showcasing multiple product surface finishes, colours and textures on a single 3D model, generating dynamic and changing spaces or installations, or creating engaging and immersive product advertising, to name a few.

Aligned to the subtheme of “Doing: Exploring new pathways in design education”, this paper reports on a three-year qualitative action research project, comprising five undergraduate Industrial Design projects, exploring the potential means of enhancing teaching practices by effectively and efficiently incorporating projection mapping into student projects to achieve increased student engagement and learning. This paper presents an overview of the project’s context and methodology together with a selection of project outcomes and key findings through a discussion of student and lecturer reflections regarding the relevance and efficacy of incorporating projection mapping into undergraduate teaching and learning.

Keywords: Action research, digital technology, industrial design, industry 4.0, projection mapping.

Introduction

Klaus Schwab (2016:8) defines the Fourth Industrial Revolution (4IR) as the fusion of technologies that blurs the lines between the physical, digital, and biological domains. Across the creative industries, the 4IR is expanding the possibilities for creativity, collaboration, experimentation, and innovation. Emerging technologies are significantly impacting the field of Industrial Design, transforming the way products are conceived, developed, and manufactured (Ferrari 2017). The means through which designers can visualise, prototype, and communicate or test their designs are becoming faster and more dynamic, enabling designers to iterate and refine their concepts more efficiently. The field of industrial design has also shifted from being product-focused to being more service and service orientated (Ferrari 2017).

It is argued that Higher education curricula must continuously adapt to incorporate emerging and relevant technologies to best equip students with the skills and knowledge needed to thrive in a digitally driven industry (Penprase 2018, p. 217; Adelabu & Campbell 2020). However, incorporating these technologies into a curriculum, not only provides the necessary tools and skills for participation in industry but can also engage students more interactively and experientially (D'Angelo 2018). It is, therefore, also important for Industrial Design higher education to explore how technology can be used to enhance the way students learn, explore, and apply design principles.

This paper presents findings from a three-year action research project which explored means of incorporating projection mapping into industrial design undergraduate projects with the aim of achieving increased student engagement and learning. This paper provides an overview of the research context and methodology, gives a description of the student briefs, highlights a selection of project outcomes, and discusses significant findings by examining the reflections of students and lecturers.

Context

This research took place in the Department of Industrial Design at the University of Johannesburg. As the oldest and largest of four tertiary institutions offering Industrial Design in South Africa, we acknowledge that the department is well resourced in the technology mentioned below, and this may not be the case in all tertiary institutions in South Africa and Africa.

Because the field of Industrial Design is so closely aligned with technological shifts (Ferrari 2017), the curriculum taught within the department (and most higher education institutions) already integrates many digitally driven tools. Examples of technologies that are already integrated into the department include paid-for and open-source digital design and prototyping tools such as 2D and 3D CAD software. These technologies allow students to create, visualise, and iterate designs in a virtual environment. Digital fabrication and rapid prototyping technologies like 3D printing, laser cutting, and CNC machining technologies are also commonly used within larger industrial design departments. These tools enable students to create physical prototypes of their designs quickly and cost-effectively, allowing them to evaluate the usability and functionality of their products.

As 4IR continues to blend the physical and digital realms, it is important for higher education institutions to evaluate the benefits these advances offer to the practice and explore effective ways of integrating them into teaching and learning. Virtual reality (VR) and augmented reality (AR) are examples of newer technologies that allow designers to merge the digital and physical realms. Virtual reality (VR) is a fully immersive technology that allows users to experience and interact with computer-generated virtual 3D environments using specialised hardware, such as a VR headset or goggles (Jerald

2015). Augmented reality (AR) describes a “real-time direct or indirect view of a physical, real-world environment that has been enhanced/augmented by adding virtual computer-generated information to it” (Carmigniani & Furht 2011, p. 3). While virtual reality (VR) completely immerses users in a virtual/digital world through a headset, AR blends the physical and virtual worlds together, typically using a device like a smartphone or AR glasses and superimposes virtual objects and cues upon the real world in real time (Carmigniani & Furht 2011, p. 3). While VR and AR both offer significant opportunities for application in Industrial Design, they require powerful (and expensive) equipment, such as headsets, AR glasses, smartphones, etc., making them inaccessible in most contexts and preventing them from being effectively and equitably integrated into teaching and learning processes. Comparatively, projection mapping is a tool that can achieve similar practical and learning outcomes at a much lower cost as it makes use of technologies that are readily available to consumers (Rowe 2014, p. 156).

Projection mapping, also known as spatial augmented reality (SAR), is an adaptable and dynamic technology that brings together the realms of art, technology, and design. Projection mapping is a simpler version of AR, which uses projectors to map images and animations onto real-world objects or surfaces (Rowe 2014, p. 155). By accurately aligning digital images, videos, or animations onto a surface or structure, projection mapping can transform static objects into dynamic displays, offering unique and immersive approaches to design visualisation (Katkeviča & Strode 2022, p. 1004-1005). In the context of the design process, projection mapping serves as a powerful tool for communicating design ideas to stakeholders, clients, and end-users, enabling clearer and more engaging presentations as students bring their concepts to life in dynamic and interactive ways. With its ability to blend the digital and physical worlds seamlessly, projection mapping offers endless possibilities for creativity and immersive experiences (Rowe 2014, p. 156). Projection mapping itself dates to the late 1960s when it was mostly used for special film effects and film studio amusement parks (Katkeviča & Strode 2022, p. 1004). Since then, projection mapping techniques have gained popularity and application in several industries, such as entertainment, advertising, marketing, interior design, education, exhibitions, events and brand experiences to name a few (Katkeviča & Strode 2022, p. 1004-1005).

As projectors are already an available tool within the department, the technology is accessible and well understood, making the uptake of projection mapping as a new technology faster and more effective than VR. Industrial Design graduates work in a wide variety of industries and given the vast number of applications of the projection mapping medium, make it a relevant skill to incorporate into an industrial design curriculum.

Theoretical framework and methodology

According to Sanford, Hopper, and Starr (2015, p. 28), “learning can only take place when the learner is engaging in an active process of building and creating knowledge through participation and interaction”. Framed by Dewey’s (1986) pragmatic philosophy on learning through experience and reflection, this research draws on David A. Kolb’s Experiential Learning Theory (1984) and Kurt Lewin’s Action Research Model (1946), specifically, their emphasis on learning through experience, reflection, and action. With the goal of reflective learning, action research is an approach to educational research that educational practitioners and professionals commonly use to examine, and ultimately improve, their pedagogy and practice (REF). This study explores the potential for enhancing teaching practice by incorporating projection mapping into the Industrial Design curriculum through project-based inquiry (Lewin 1946). Instructors aimed to create engaging learning experiences by experimenting

with projection mapping within the existing departmental project briefs, all with the aim of enhancing student engagement and improving learning outcomes (Clark, Porath, Thiele & Jobe 2020; Kolb 1984).

The research followed a qualitative action research approach and involved five undergraduate Industrial Design projects (Action Research Cycles) conducted between 2021 and 2023. These projects took place in varying practical modules and spanned across different academic levels, ranging from first to third-year students (Figure 1). For each of the five projects/cycles, the steps of Plan, Act, Observe, and Reflect were followed (Altrichter et al. 2002, p. 130). Planning encompassed the development of the project brief and the definition of project requirements and assessment criteria. The "Acting" phase involved executing the project, while the "Observation" phase entailed lecturer observations and the assessment of project outcomes. As teaching and learning are interrelated in the effectiveness of education, lecturers and learners must be involved in the reflection (Schratz 1992, p. 83). At the end of each project, students were asked to reflect on the process and outcomes by completing an online questionnaire (Schratz 1992, p. 87). Finally, the "Reflection" phase involved the analysis of student and lecturer reflections and sharing key findings to inform the following cycle.

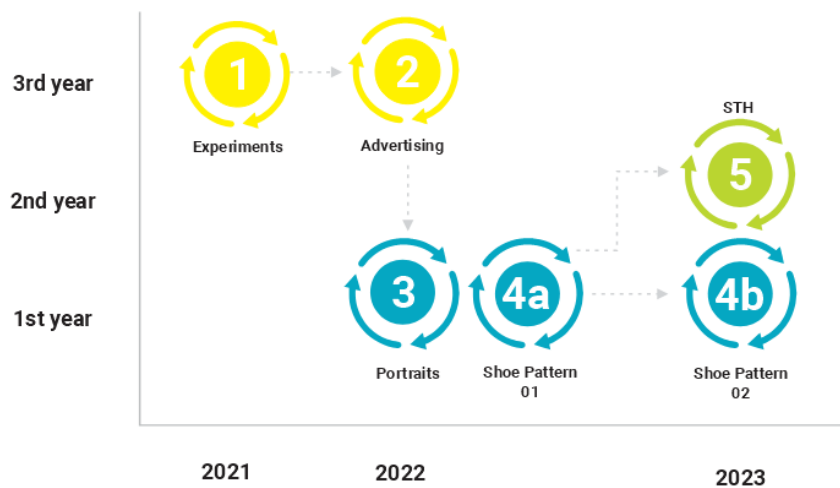


Figure 1: Action Research Cycles 2021-2023

To give context to the research findings, we offer an overview of each of the five project cycles, including details about the project brief and its requirements. Additionally, for each project, we showcase various project outcomes to showcase the efficacy of each project.

Cycle 1: Initial experimentation, third year 2021

In 2021, initial experimentation with projection mapping took place informally with third-year students. In order to introduce the students to the method of projection mapping onto 3D objects, a sphere was prepared for an in-class demonstration. A 1m diameter inflatable beach ball was skinned with paper-mâché to create a smooth white surface. This sphere was suspended from the ceiling in the departmental computer studio, and a mobile standard digital projector was pointed at the sphere. Students then experimented by projecting various existing animations, images, 3D CAD models and textures onto the sphere (Figure 2).

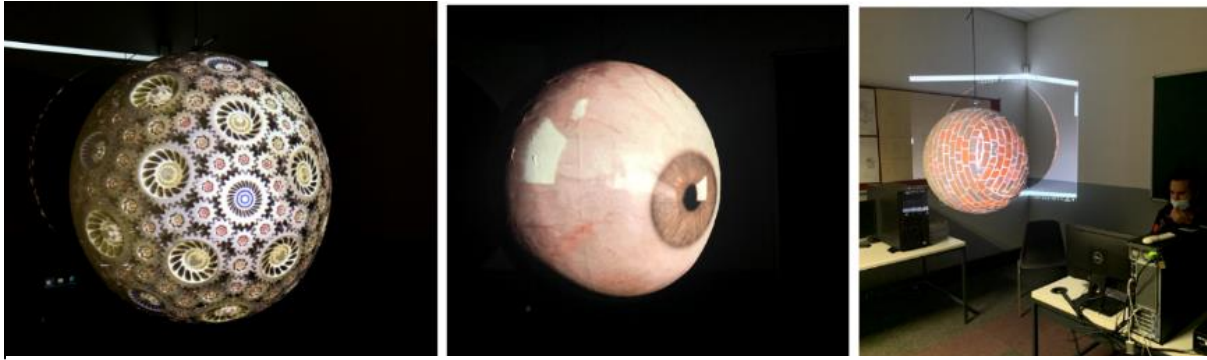


Figure 2: Projection mapping experimentation with suspended sphere (2021)

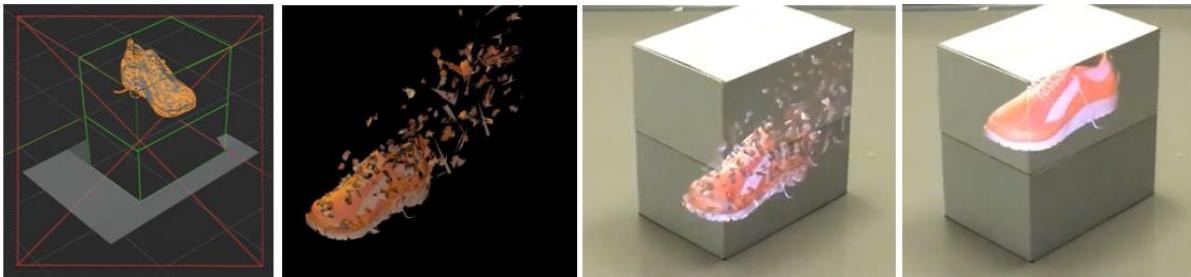


Figure 3: Student A shoe advertising concept (2022)

Building on the discovered potential of projection mapping, the 2022 third-year students, in a relatively open-ended brief, were tasked to develop an innovative product or display system that incorporated projection mapping. Because projection mapping offers the benefit of being able to change and adapt product surface finishes, students were required to incorporate animated or changing images into their outcomes. Students had the freedom to interpret the application of this brief, resulting in varying approaches. Student outcomes included a variety of new approaches to in-store product displays and product advertising. For example, Student A imagined an installation of shoeboxes (Figure 3) that, with the use of projection mapping, presented various animations (created in Blender) illustrating the range of products on sale. Similarly, Student B conceptualised how a projection mapping system could be used within McDonald's restaurants to creatively display the different flavours/brands of soft drinks they offer through a series of static and moving projections onto a white soda cup (Figure 4).



Figure 4: Student B McDonalds soda advertising concept (2022)

Student C designed a 2.5 m interactive sculpture/installation (Figure 5). In order to create the sculpture, the student used a handheld 3D scanner to capture a detailed 3D model of their head and face, saving it as an STL file. Using a series of software tools, including Papakura, which facilitates the transformation of 3D models into flat triangles, and the Decimate command in Blender, the 3D model was simplified into a more geometric polygonal form comprising a series of triangles. These simplified triangles were then printed, cut out, meticulously folded, and assembled to recreate the 3D sculpture. The final sculpture, measuring 2.5 meters in height, 1.6 meters in width, and 1.15 meters in depth, was crafted from 3mm corrugated cardboard. In order to enhance the visual impact of the sculpture, a standard overhead projector was positioned approximately 5 meters away, enabling the projection of a diverse range of images, videos, and textures onto its surface. This creative projection technique resulted in a captivating and visually engaging experience, yielding numerous interesting outcomes. Notably, this achievement found practical application as the sculpture served as a striking backdrop for the faculty's annual fashion show, further showcasing its successful integration into real-world settings.

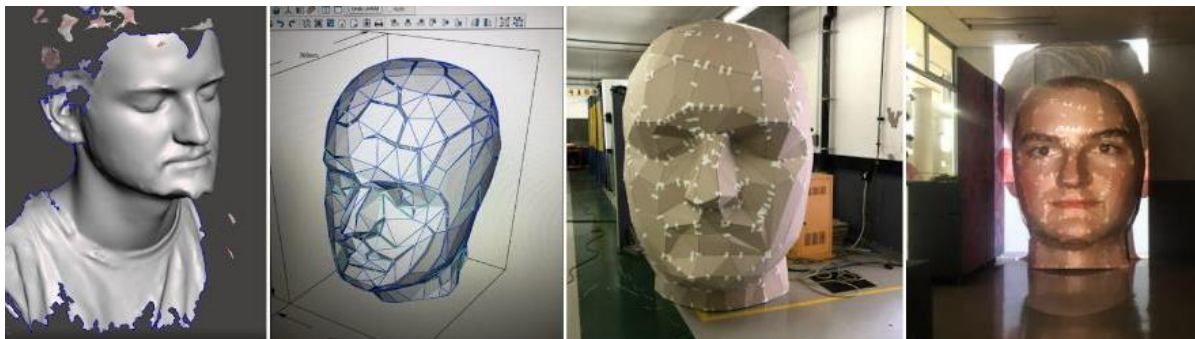


Figure 5: Student C 'Big Head' installation sculpture (2022)

Cycle 3: Mixed media identity portrait, first year 2022

Cycle 3 was facilitated at a first-year level in a digital-based module. The “mixed-media portrait” project has been run in the department for a few years, as a means of introducing the basics of bitmap manipulation and creating mixed-media compositions in open-source software, GIMP. Each year, students are tasked to create a mixed-media identity portrait (composite image) inspired by their personalities, backgrounds, and heritage. Traditionally, this project concluded with a 2D poster output of their portrait. In this case, the project went a step further, whereby the portraits were to be projected onto the large face sculpture, ‘Big Head’ from the previous cycle. This project formed part of an international collaborative project with the University of Cincinnati titled Art as a Catalyst for Global Understanding. The additional element of projection mapping involved an added level of complexity, whereby careful consideration of the alignment of their portrait photographs to a face template (Figure 6) was required during the file preparation phase to ensure accurate alignment with the sculpture. Figure 7 shows a selection of outputs showcasing the variety and quality of digital files created.

Third-year students were also invited to create projections for the sculpture. Student B moved a step past a static projection and developed multiple versions of their mixed media portrait (Figure 8), which were compiled into a slide show video. This creative approach allowed for the presentation of various mixed-media versions in a dynamic and visually engaging manner, enhancing the overall impact of the installation.



Figure 6: Cycle 3, Student D, process steps of aligning to face template (2022)



Figure 7: Cycle 3, selection of outcomes Students E, F, G (2022)



Figure 8: Student B Mixed media portrait variations and projection (2022)

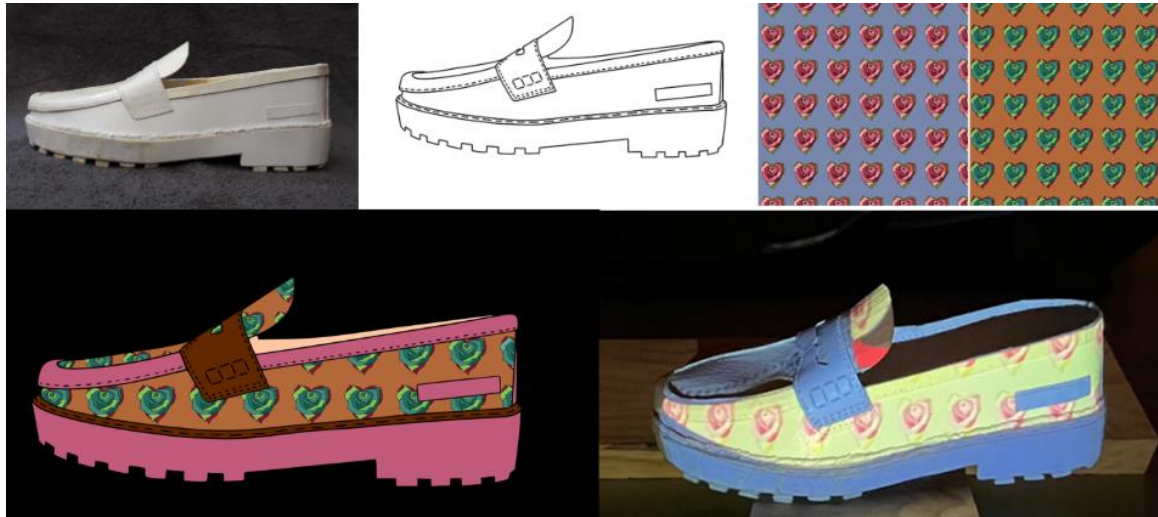


Figure 9: Shoe pattern projection process of steps (2023)

Cycle 4: Shoe pattern, first year 2022-2023

The next project was, again, facilitated at a first-year level in the digital module, linked to a project completed in the students' core practical design module. The "pattern project" has been run in the department for several years, as a means of teaching design elements and principles of colour theory and pattern creation as well as the practical introduction to vector creation in open-source software, Inkscape. In previous years, students were tasked with creating colourful 2D patterns, which were digitally clipped into outlines of various clothing item outlines, such as Converse high tops and swim shorts. In 2022, the brief was adapted to incorporate and explore how projection mapping could elevate the complexity, accuracy, and applicability of this project, bringing the typically 2D digitally bound content into the 3D physical space. Students were tasked with designing a contemporary pattern in two colour schemes to be digitally mapped onto 3D triplex model shoes, which had been created in their core design practice module. Students were required to photograph their triplex model shoe (side view) and use the vector tools in an open-source vector creation software, Inkscape, to create a digital line drawing of their shoe, tracing the photograph. Patterns were then clipped into the areas of the shoe. These digital mock-ups were then projected onto the physical shoes (Figure 9). This project was run for two cycles, in 2022 (4a) and again in 2023 (4b).

Cycle 5: STH Installations, the second-year 2023

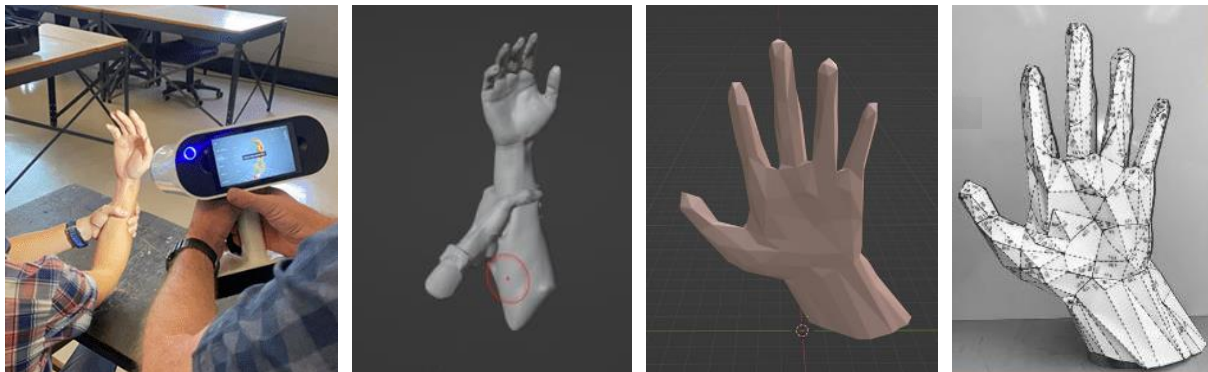


Figure 10: 3D scanning and modeling process (2023)



Figure 11: STH Installation projection mapping outcome (2023)

Building on what they learned in their first year (2022), in 2023, second-year students were tasked to create both static 2D images and motion videos that were presented in 3D environments using projection mapping. Students were tasked to design and manufacture a projection-mapped stage set for a School of Hospitality (STH) open day with the broad theme of 'advancing inclusivity'. Students were divided into four groups to develop large-scale free-standing cardboard models that were used as surfaces for digital images, animations, and videos to be projected onto. Similar to 'Big Head,' the cardboard models were created by first generating a CAD model. This was done by either digitally modelling the form or using a 3D scanner that generated a model based on existing physical forms (Figure 10). The models were then put through a tessellation tool that simplified them into faceted forms before using further software that generated a 2D net of the tessellated model. These nets were then laser cut and used to physically build free-standing models to create a 'diverse landscape' that would be projected onto to create an immersive event environment. After creating their physical models, students went on to individually create vectors, GIFs, photograph collages, and videos that were projected onto the 3D surfaces of their models (Figure 11).

Reflections and discussion

A key component of action research is the method of reflection (Clark et al. 2020). Research is primarily concerned with the generation of knowledge and action research generates *reflective* knowledge in practical educational contexts, allowing educators to learn through their actions to develop personally or professionally (Clark et al. 2020). Encouraging students and lecturers to reflect on their actions and experiences enables a better understanding of those experiences and the consequences of those actions (Clark et al. 2020). At the end of each project, students were asked to

document their personal experiences and reflections on the project. Key findings from these reflections are presented below.

Student reflections and feedback

Most students found projection mapping to be an effective way of realising their designs. It served as a method of envisioning what a final product would look like and allowed for multiple colours, surface finishes, and graphics to be illustrated on their products. While multiple students described the projection-mapped images to be realistic, the technique was also criticised for only being somewhat realistic or not realistic at all, with the projected image being difficult to align with the actual 3D models. While not all outcomes were successful, multiple students reported finding the projections an effective way of developing their design skills and learning more about the importance of proportions and scale. Students reported that the incorporation of projection mapping within a design brief added a “creative element” to a project and was described as “exciting” and “interesting” and evoked new perspectives. The use of projection mapping made their designs “come alive” and “encouraged a sense of accomplishment”. The technique was viewed as a successful way of engaging with the work their peers had created. This feedback illustrates that the incorporation of new and immersive technologies can also be viewed as an effective way of improving student engagement. Students also reflected on how projection mapping added value to the creative process. One student speculated on the method being used as part of the design ideation process, realistically illustrating digital developmental work in the physical realm before adjusting and developing a design. Using projection mapping reduced prototyping materials and costs and allowed for rapid design iterations to be made within the design process. When speculating on how projection mapping could be successfully used within the South African Industrial Design industry, students remarked on various aspects. The accessibility and affordability of projection mapping was seen as a benefit that could help designers save on having to create multiple product models and instead make use of this technology to illustrate multiple product finishes on a single prototype. It was also described as a way of elevating the presentation of design concepts to clients. It was described as a tool that could aid designers in easily changing and adapting design concepts and enable the creation of immersive and convincing environments for an audience.

Lecturer’s reflections

Conducting a project at the first-year level presents its challenges as students are still in the process of acquiring fundamental skills in prototyping, digital work, and photography. Reflecting on the mixed media portrait project (Cycle 3), we believe that projecting still images onto the structure was suitable for a first-year level, where the focus was primarily on file preparation and execution while learning the basics of bitmap manipulation. Providing a template to which the students could align their work, proved successful, with most projections aligning successfully. However, reflecting on Cycle 4, the shoe pattern project relied more heavily on the quality and level of detail of the original triplex model shoe and the accuracy of subsequent stages of photography and vector creation. Students who had shoe models with limited surface area, as seen in Figure 12, faced challenges in achieving effective projections and pattern application compared to those with more surface area. Additionally, instances where students did not follow instructions, such as capturing exact side-on photographs of the shoe, did not achieve effective projections, as the image did not align with the model accurately, as seen in Figure 13. Therefore, in future iterations, one might consider using a “universal” sneaker/boot for all students and provide a template as done in the mixed media portrait to allow for more effective projection outcomes.



Figure 12: Unsuccessful projection due to limited surface area (2023)

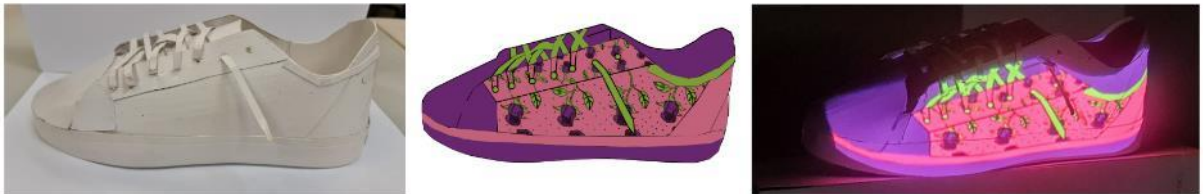


Figure 13: Unsuccessful projection due to misalignment (2023)

On a second-year level, the STH installation project was used as a means of introducing further design skills such as animation and video editing. The integration of projection mapping is intended to increase the engagement of students, giving them the opportunity of seeing their design outputs being presented in a public setting outside of their departmental studio. Applying a general theme to the project allowed the students to engage with design outcomes on a more conceptual level. Along with training in new hard skills, students also explored more around how images and videos could be used as a form of effective visual communication. Along with this, the project also introduced a wider scope of potential advantages and uses that projection mapping could offer, making it a steady progression from what was undertaken in the first-year projects. The combination of group work and individual outputs was effective, as four successful large-scale models were designed as projection surfaces. Individual outputs of images and videos to be projected were not all successful, however, due to varying skill levels. Not all images were proportioned correctly to line up with the model and the quality of images and videos generated were insufficient in some cases. Therefore, images and videos for the STH open day exhibit were carefully selected. With a large variety of outcomes, this made it possible to create an engaging and immersive display.

Conducting the projection-mapping project at the third-year level provided an opportunity to explore a wider range of project outcomes, varying in their complexity and feasibility for implementation. As these students were in their final year of studies, they were granted the freedom to define their individual project directions. This approach resulted in a diverse collection of approaches and applications, which may not have been explored if the lecturer had predetermined the project focus. The open nature of the brief also allowed for a wider exploration of potential projection mapping applications to emerge.

Conclusion

As the Industrial Design discipline changes and adapts to the technological shifts driven by Industry 4.0, higher education institutions need to adjust their curricula accordingly. By integrating emerging technologies such as projection mapping into design projects, students can acquire the essential skills and knowledge necessary for a rapidly changing professional environment. Our findings outline the

positive impact of using projection mapping as a pedagogical tool to enhance student engagement and learning outcomes.

Furthermore, our study contributes to the discourse on how the integration of advanced digital tools, such as projection mapping, effectively prepares students for the challenges and opportunities presented by 4IR. Specifically, our findings recommend the introduction of projection mapping in the initial years of study, allowing students to become familiar with this technique. As students progress into their third year of study, they can apply this understanding and use projection mapping in more advanced and creative ways.

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Envisioning an effective education system for Generation Alpha focused on skills development in the fashion design higher education sector

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Abstract

The design higher education system of today will not be applicable to the demands and requirements of tomorrow (Munir & Nudin 2021). Furthermore, Generation Alpha introduces a new challenge to our current education systems, demanding a new approach to education. Accordingly, Karen Gross, the author of *Breakaway learners*, believes that universities should begin adapting to cater to Generation Alpha, suggesting that thinking ahead is crucial in planning and contemplating the future's implications (Hall 2017). The research study sets out to identify trends through the review of the literature that the current design education system is outdated for the next cohort in higher design education called Generation Alpha. Additionally, the research study predicts an effective approach to educating Generation Alpha in the fashion design higher education sector as potential students and graduates by using secondary research of literature studies globally. This study aimed to contribute to this growing area of research by exploring the most effective education systems for Generation Alpha in the fashion design higher education sector through analysis of Gen Alpha characteristics and anticipated future skills required in the fashion design sector. After reviewing literature focusing on the unique characteristics of Generation Alpha and the anticipated future skills required in the fashion design sector, the Kano Model was utilised to highlight Generation Alpha's expectations and needs in shaping the future of education. Firstly, the study identified the unique characteristics of Generation Alpha, such as their strong connection with technology and their need for digital literacy. Accordingly, the findings from the literature review suggest that the fashion design industry is becoming more technology-driven, requiring CAD and robotics skills, amongst other technologies. Consequently, the fashion design higher education system for Generation Alpha should involve digital literacy, robotics, AI, big data analysis, and other STEM-related skills to meet their needs based on Generation Alpha characteristics and prepare them for future fashion design careers.

Keywords: Design education, fashion design, future education, Generation Alpha, Kano Model, technology.

Introduction

We're preparing a generation for a world we cannot imagine, and jobs that don't currently exist (Goyal 2020).

The above quote suggests that envisioning the skills for future generations will be strenuous due to the unknown demands and changes of the future world of work. The future of the higher education sector is uncertain, and the skills acquired from higher education should go beyond preparing the student for the existing career opportunities in the design industry (Munir & Nudin 2021, p. 144). In order to prepare for the future of education, it is also important to consider the future student; specifically, Generation Alpha. This generation introduces a new challenge to our current education systems. They are widely defined as the population born from 2010 until 2024 (Munir & Nudin 2021, p. 138; Ziatdinov & Cilliers 2021, p. 23). Education approaches need to be developed to fit the characteristics of the generation and suit the zeitgeist of the era (Munir & Nudin 2021, p. 144). The upcoming generation of students entering higher education will have distinct skills and needs (Ziatdinov & Cilliers 2021, p. 22), requiring educators to adopt innovative teaching methods to cater to their requirements and enhance their learning experience in the design sector.

Recent research indicates that the traditional model is ill equipped to tackle the challenges presented by the 21st-century digital, global economy (Halabieh, Haya & Hawkins, Sasha & Bernstein, Alexandra & Lewkowict, Sarah & Kamel, Bukle & Fleming, Lindsay & Levitin 2022, p. 13). Research findings have identified existing shortcomings within our contemporary education system, such as outdated pedagogical approaches and a lack of career-relevant skills (Halabieh, Haya & Hawkins, Sasha & Bernstein, Alexandra & Lewkowict, Sarah & Kamel, Bukle & Fleming, Lindsay & Levitin 2022, p. 13). According to Sampoerna et al. (2020) and Wahyuddin et al. (2022) the existing research on how Generation Alpha learns is limited to the elementary education field due to the young age of the oldest members. Current reports on the future of education as seen in the Education 2030 report by OECD (OECD, p. 2018) and the UNESCO report 'The Futures of Education for Participation in 2050: Educating for Managing Uncertainty and Ambiguity' (Haste & Chopra 2020) exclude Generation Alpha and lack conclusive evidence on how they will be integrated into predicted trends.

Few studies have investigated the association between the future of work and preparing students in higher education for these careers (Goyal 2020; Jukes, McCain & Crockett 2010). Research indicates that the current educational system fails to prepare students for future careers that do not yet exist. This is supported by Kasriel (2018), who states that the future of work will require a skill-focused approach rather than a degree-focused one.

Within the context of the design industry, there is a scarcity of studies that address skills development in higher education (Dutta 2020; Starling & Steen 2019). The perception of skills' value in the design industry varies among students, professionals, and faculty members, highlighting the need for alignment between education and industry expectations (Starling & Steen 2019). The evolving nature of the design sector necessitates a close examination of how fashion design education can equip Generation Alpha students with the adaptable skills required for the uncertain future landscape.

The purpose of the study is twofold. Firstly, investigate the implications of technological trends in the field of fashion design for the future of the fashion design education field, with a specific focus on understanding the significance of these technological trends in shaping educational approaches and methodologies. Lastly, identify the key technological competencies that will be imperative for Generation Alpha fashion designers, exploring the specific technologies and digital literacies aligned with the needs of the emerging cohort to thrive in the evolving landscape of fashion design.

Research questions

This study analyses the needs of Generation Alpha and envisions the necessary skills by reviewing existing literature on their characteristics, trends, and technological advancements. It aims to gain insights into the future of fashion design education and identify essential skills for future designers.

1. Given our current understanding, how could the landscape of design education evolve in the future?
2. How does the significance of present-day trends translate into the forthcoming landscape of design education?
3. Which technological proficiencies will be essential for Generation Alpha designers to possess?

Literature review

Generation Alpha defined

Generation Alpha is the population that is born between the years 2010 and 2024 (Zmuda et al. 2017). Interestingly, the birth year 2010 coincides with the launch of the iPad and Instagram (Jha 2020, p. 2). It comes as no surprise that Generation Alpha is the most technologically literate in human history, which results in the group having specific and distinct needs (Zmuda et al. 2017). Accordingly, they are the first generation that is living in a digital environment from birth (Danilova 2023, p. 59). Also referred to as 'digital natives' have unique characteristics such as 1) creativity, 2) dynamism, 3) leadership, 4) growing and interacting with a variety of technologies, and 5) dealing with digital literacy (dos Reis 2018, p. 17; Munir & Nudin 2021, p. 139). Generation Alpha will soon fill classrooms in universities and require unique approaches to teaching and learning based on their unique characteristics (Ziatdinov & Cilliers 2022, p. 22). This enhances the importance for educators to prepare for the next generation of students who will enter the higher education sector based on their unique characteristics. Mannheim (cited in Jha 2020, p. 5) states that Generation Alpha has been influenced by various events, including the global financial crisis recovery in 2008, digital technologies, social media, changes in family structures and the ongoing COVID-19 pandemic. Furthermore, the vulnerabilities emerging from digital technologies include cognition (Wilmer et al. 2017), sleep (Jha et al. 2019), and lower emotional well-being in comparison to previous generations (Augner & Hacker 2012).

Anticipated future skills in the design industry

Due to the emerging technologies, students are required to develop and enhance STEM (science, technology, engineering, and mathematics) skills. These skills will include coding and building robots (Darmawansah 2023). It is suggested that STEM skills for students will replace the current academic writing and language skills. Previous studies have reported that STEM education has emerged as a prominent educational initiative (Reiss & Holmen 2007; Sanders 2009), representing a field of study that connects science, technology, engineering, and mathematics in an interdisciplinary manner. Other skills that will be important for the future of education [2050] include 3D printing, virtual environments, virtual blockchains, and virtual digital applications (Solis 2022). This means that school curriculums will become more decentralised due to technological changes (Hillman, Rensfeldt & Ivarsson 2020).

McCrinkle and Fell (2020) state that Generation Alpha students should be introduced to the skills of robotics, social media marketing, app development, and big data analyses to equip them for the Fourth Industrial Revolution (Industry 4.0) for careers that do not exist yet. The utilisation of valuable

insights derived from big data as a skill has the potential to enhance learning, teaching, and administrative processes (Daniel 2015). As a result, the exploration of big data and artificial intelligence (AI) in the field of education is becoming increasingly important for the future student (Becker et al. 2017). One of the most important skills identified for the future student is robotics (Barak & Zadok 2009; Han & Kim 2009; Alimisis 2013; Mndende 2022). Studies have proven that incorporating robotics into education has a beneficial effect on student behaviour in particular areas, such as problem-solving abilities (Barak & Zadok 2009), collaboration (Hong et al. 2011), motivation to learn (Kubilinskienė et al. 2017), active participation (Rusk et al. 2008) and class engagement (Han & Kim 2009; Alimisis 2013). Interestingly, the Department of Basic Education (DBE) in South Africa has included robotics and coding in the curriculum for younger grades in 2023 and aims to introduce these subjects to Grade 9 students by 2025 (Mndende 2022). There is already evidence of the incorporation of robotics in a few universities, such as Manchester Metropolitan University, which is in the process of establishing a research facility called the Robotics Living Lab (ROLL), which aims to support micro-scale fashion businesses by using robotic technologies to promote sustainable production methods (Abdulla 2023; Bithell 2023). For the design sector specifically, an important skill highlighted is computer-aided design (CAD) software, which requires design software skills as it is essential for fashion designers to complete fashion-related projects, which is vital within the contemporary fashion industry (Kiron 2023). Robotics as a skill is already seen within the fashion design sector: SewBot from SoftWear (Newton 2022), Zornow's Sewbo (Kavilanz 2016), and LOWRY Sewbots (Barman 2021). However, most fashion design institutions in South Africa still teach the traditional methods of garment construction.

As mentioned in the previous section, Generation Alpha has a strong connection with technology (dos Reis 2018, p. 11). Digital up-skilling must be integrated into the higher education approach to developing a digitally literate workforce needed for the future. The education sector plays a vital role in developing these advanced skills by incorporating Industry 4.0 technologies, as mentioned above. Industry 4.0 education design includes skill-based education and digitised learning (Munir & Nudin 2021, p. 141). In order to fully benefit from digitalisation, we must strengthen the innovation culture in education. This requires the right institutional and regulatory approaches (OECD 2022, p. 9). In the present day, academic institutions are already accepting the need for better integration of technology into education (Ziatdinov & Cilliers 2022, p. 6). But Blessinger et al. (2022) argue that most higher education institutions have not made the shift to cater for Industry 4.0.

The current design of higher education systems

The difficulties with the current educational system investigated raised in this study are threefold: [1] Firstly, research suggests that the future of work will require a skill-focused approach rather than a knowledge/degree approach (Kasriel 2018). [2] Secondly, published reports on the future of education: HolonIQ's report on Education in 2030 and the UNESCO report, 'The futures of education for participation in 2050: educating for managing uncertainty and ambiguity' omits information on Generation Alpha: entering higher education in 2028. [3] Lastly, studies are reporting on the outdated educational system and the irrelevance of universities in the future of education (Mouton, Louw & Strydom 2012; Llopis 2022). Technology allows education to become more flexible and accessible, breaking down geographical and time-related barriers, and it can redefine the way educational institutions are structured, with a reduced emphasis on physical infrastructure in favour of digital and online learning platforms (Blessinger, Singh, Poobalan & Nauman 2022).

Soni (2021) discusses the evaluation of current education systems by the World Economic Forum (WEF) and highlights that 60% of future jobs have not yet been developed, underlining the rapidly

evolving nature of the job market and 40% of nursery-age children in schools today (Generation Alpha) may need to pursue self-employment to generate income in the future, indicating a shift in the nature of work (Soni 2021). The research findings indicate that the global transition into the Fourth Industrial Revolution, marked by substantial technological progress, may pose challenges to existing education systems in adequately equipping individuals for the continuously evolving job market (Soni 2021). This scenario gives rise to concerns regarding the effectiveness of education in meeting the future workforce's requirements and challenges (Soni 2021). Universities should incorporate soft skills used in modern work to equip students for their careers. Hansen (2021) has reported that educational systems are not held accountable for equipping students with the required skills to prepare for careers and workplace readiness, while employers mostly rely on traditional degrees as the main requirements for determining whether the candidate is suitable for the position. Hansen (2021) has concluded that there is a high rate of underemployed or unemployed individuals, which is a direct result of the disconnect between the education system and employers. Zmuda et al. (2017) revealed that the current educational system focuses on the needs of Generation Z while using the generation's resources and sharing baby boomers' content. The learning of the different generation groups are as follows: Baby boomers 'learning was structured and formal, Generation X engaged with a relaxed and interactive learning process, Millennials 'learning the inclusion of multisensory and multimodal technologies and Generation Z engaged with learner-centred approaches (Zmuda et al. 2017). Modifications are necessary for the higher education system to accommodate Generation Alpha, considering their unique learning approaches shaped by cultural norms and traditions (Jha 2020; McCrindle 2008).

Generation Alpha education systems

Private tech companies are actively introducing innovative approaches to education by incorporating technologies like augmented reality to create interactive learning experiences (Goyal 2020). These companies are gamifying education and developing digital play and learning platforms, aiming to enhance the educational paradigm (Goyal 2020). It has been suggested that future assessments will include AI-driven diagnostic assessments to measure student success, where students will not achieve letter grades that indicate failure or pass (Solis 2022). This study emphasises the resemblance between the workplace and the promotion process, where individuals progress to higher managerial positions based on meeting specific requirements or tasks (quality of work) rather than receiving a grade for task completion. Solis (2022) suggests that teachers will no longer be required to physically present a classroom due to the online nature of classes where students can connect online. This will allow for job opportunities, such as virtual teachers, since the classroom will include virtual and robotic teachers and education assistants (Solis 2022).

Opportunities: Generation Alpha education systems

The one-size-fits-all education approach will not be viable to Generation Alpha, as they are accustomed to personalisation and will require it in their educational framework as they are used to technologies that immediately respond to their needs (Hosid 2021). Zmuda et al. (2017) and Hughes (2020) have reported that classroom experiences should shift focus from content mastery to meaningful skills-based experiences, allowing Generation Alpha to innovate and share their knowledge effectively. Research by Ziatdinov and Cilliers (2021, p. 7) refers to opportunities for teaching, as cited by Nagy and Kölcsey (2017) that includes social media as a teaching tool and that classroom engagement should develop knowledge over accessing existing knowledge (Ziatdinov & Cilliers 2021, p. 7). Social media is a tool that Generation Alpha is comfortable with and should be incorporated as part of the learning process (Dani 2023). Teachers can use social media in the

classroom to share study materials, opinions, and projects by commenting on posts, sharing links to other websites, building peer networks, and enhancing the online learning experiences that will result in a culture of collaboration and sharing that leads to an improved learning experience (Dani 2023).

Challenges Generation Alpha education systems

Ziatdinov and Cilliers (2021, p. 6) assert that academic institutions are already aware that technology needs to be incorporated into the education system, which will influence the way that future students learn (Glenn 2008). An important note is that Ziatdinov and Cilliers's research (2021, p. 6) was not conducted in Africa, as the most significant problem with emerging technologies within the educational sector is load shedding. Most research provided on the future of education includes the usage of technology. However, to the researcher's knowledge, no current research studies are being conducted taking the consideration of load shedding into account within the South African context of higher education. South African Democratic Teachers' Union (Sadtu) spokesperson Nomusa Cembu, as cited by News 24 (McCain 2022), stated that load shedding is disrupting teaching and learning and the current shift towards a digital era in schools is placed on hold, suggesting that the implementation of technology into the educational sector within South Africa is more difficult.

Discussion

Several studies in the field of education have employed the Kano Model as a theoretical framework, treating students as clients of the educational institution, as observed in the research of Venkateswarlu, Malaviya, and Vinay (2020), Kuo, Chang, and Lai (2011), and Madzík, Budaj, Mikuláš, and Zimon (2019). The Kano Model employs a 2D, non-linear approach to evaluate user satisfaction by analysing product quality attributes, enabling an assessment of whether specific features are perceived as delightful or displeasing by customers (Venkateswarlu, Malaviya & Vinay 2020). Customer satisfaction is contingent on the service's performance relative to customer expectations (Parasuraman, Zeithami & Berry 1997). The research focuses on characterising the needs of Generation Alpha to anticipate the technological trends (services) they will expect as part of their fashion design education when entering higher education. De Shields et al. (2005) underscored the influence of courses aligning with real-world trends, live projects, and practical cases on fostering a positive college experience for students (Deshields, Kara, and Kaynak 2005). Adapting the Kano Model to education underscores the shift toward student-centred learning, which is an important factor to consider when teaching Generation Alpha (Arifah, Munir & Nudin 2021). Research suggests that future educational initiatives should employ a student-centred approach, primarily aimed at addressing the resurgence of Industry 4.0 within Generation Alpha (Arifah, Munir & Nudin 2021).

The Kano Model highlights the significance of students' expectations and needs in shaping the future of education, considering education as a service provided by universities to Generation Alpha students, who are seen as the primary customers, in order to ensure that education evolves and fulfils the needs and desires of students. As a result, students are viewed as customers of this educational service (Sherry 2021). In this perspective, universities are seen as service providers responsible for delivering educational programmes and facilitating learning experiences that meet the needs of the future Generation Alpha student as the customer. This model categorises features into five distinct groups: basic, performance, delight, and needs. These categories enable researchers to prioritise the anticipated fashion design skills based on the insights derived from the literature review, allowing the researcher to recognise and predict the unique needs foreseen for Generation Alpha in fashion design education to help educators tailor the curriculum to meet the specific needs of this generation and ensure a relevant and impactful education.

Table 1: Kano Model showcasing types of needs of Generation Alpha in design in higher education

basic needs (expected features):	Performance needs (Satisfiers):	Excitement needs (Delighters):	Indifferent needs:	Reverse needs (Unspoken needs):
Accreditation basic curriculum qualified Instructors skills-based experiences (Zmuda et al. 2017; Hughes 2020). digital literacy: Basic computer skills, internet skills (Hansen 2021).	Advanced curriculum, practical experience, education system – focus on skills-based experiences (Zmuda et al. 2017; Hughes 2020). Facilities and resources: computer numerical control (CNC) carving (Stanchieri 2022; Yasar & Essex 2023). CAD software: Adobe Illustrator, CLO3D, and Optitex.	Cutting-edge technology: Advanced AI and machine learning, quantum computing (Frąckiewicz 2023). CAD software (Kiron 2021), 3D printing, digital sketching, digital sketching: tools like Microsoft Surface Studio or Wacom tablets. 3D printing (Hye-Won & Tracy 2014).	Extensive non-core courses: various disciplines (human body engineering, medicine, chemical technology, nanotechnology, biotechnology, optics) (Qiu & Hu 2014).	Online classes: Education 4.0 makes use of Industry 4.0 technologies and active methodologies Silva et al. (2020). Examples of these methodologies (Moraes et al. 2023): hybrid learning online and offline, with distance activities, discussion groups, etc. project or problem-based learning and flipped classroom approach.

By applying the Kano Model, educators and institutions offering fashion design programmes can better understand what features and experiences will have the most impact on student satisfaction and success. It can help prioritise educational strategies, curriculum development, and resource allocation to produce well-rounded, skilled graduates ready to enter the fashion industry.

Conclusion

Insights from the literature review shed light on factors that are poised to shape the future of design education. Firstly, there will be a pronounced shift towards student-centred learning models that focus on skills development over content mastery, fostering experiential learning and reflection as alternatives to conventional grading. Secondly, the integration of emerging technologies, such as robotics, augmented reality, AI, and 3D printing, will become paramount in design education, necessitating STEM skills like coding and robotics for students to thrive in the industry. Furthermore, the educational landscape will witness a shift towards flexible learning models, including online and hybrid approaches, to cater to Generation Alpha's diverse learning preferences. These transformative trends collectively predict a dynamic and adaptable future for fashion design education, aligning it with the needs and expectations of Generation Alpha and the evolving fashion industry.

Present-day trends indicate a strong shift towards technology-driven, student-centred, and skills-oriented education. These trends align with the needs and characteristics of Generation Alpha and are expected to shape the future landscape of design education. Firstly, there will be a continued escalation in the integration of technology, with a specific focus on cutting-edge innovations such as AI, 3D printing, and robotics. These technological advancements will assume a central role in design education, stimulating creativity and fostering innovation. Secondly, the educational landscape will have a more flexible learning environment, with an emphasis on online and adaptable learning modalities. Thirdly, interdisciplinary education will also become more prevalent, with design programmes incorporating elements from diverse fields like science, engineering, and business to equip students for multifaceted design challenges. Lastly, collaboration with industry experts and real-world projects will bridge the gap between academia and the professional realm, ensuring that

students are well prepared for their careers. Together, these developments signify a future for design education that is flexible and responsive to change, characterised by its ability to adapt and evolve.

Generation Alpha designers will require a diverse set of technological proficiencies that will be imperative for success in the evolving design landscape. Firstly, a strong foundation in STEM (Science, Technology, Engineering, and Mathematics) skills will be fundamental, encompassing coding, robotics, and engineering principles. Additionally, mastery of 3D printing technologies will be pivotal, facilitating rapid prototyping and product development across various design disciplines. Fashion designers will need competence in Computer-Aided Design (CAD) software like Adobe Illustrator, CLO3D, and Optitex for precise and efficient design work. Familiarity with AI and machine learning concepts will be essential, enabling designers to harness AI-driven design tools and automation. Knowledge of augmented reality (AR) technologies will prove valuable for creating interactive and immersive design experiences, especially in fields like interior design and architecture. Proficiency in digital sketching tools, using devices such as Microsoft's Surface Studio or Wacom tablets, will enhance the design process and collaboration. Big data analytics will be crucial for leveraging data-driven insights in design decisions for future students. Understanding robotics and its applications in garment production will benefit fashion and industrial designers. Quantum computing will be applied in design and simulation, making it a valuable skill for forward-thinking designers. Lastly, proficiency in Industry 4.0 technologies, including the Internet of Things (IoT), will empower designers to create smart and connected products, ensuring they are well equipped for the design challenges of the future.

Generation Alpha designers will have to embrace a broad spectrum of technological proficiencies to thrive in the evolving design landscape, which is inclusive of both traditional design tools and emerging technologies that are reshaping the industry. As a result, design education will play a pivotal role in equipping these designers with the necessary skills and knowledge to excel in their careers.

Contribution

This research paper examines the current trends and themes in design education for Generation Alpha, focusing on how the field is evolving to cater to their needs in a technologically advanced environment. Through a thematic analysis of existing literature, the study identifies patterns and concepts that inform the future of design education for this cohort. By using the Kano Model, the paper evaluates the significance of skills and features in design education, critiques the current system, proposes strategies for developing essential skills, and contributes to the discourse on shaping the future of design education for Generation Alpha in the fashion design sector.

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SESSION 7: Learning





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Bridging the gap between industry and the lecture hall: Small-scale manufacturing machines for experiential learning within the teaching environment

Martin Bolton, University of Johannesburg

Abstract

Students in Design Education are equipped to enter their respective creative industries. It is the intention that their skills and capabilities, once they graduate, are matched as closely as possible to the industries into which they will fit. During their time within the higher education faculty, they need to be exposed to relevant technologies and processes. By adapting manufacturing technologies for small-scale use in the classroom, students can gain hands-on experience and integrate these technologies into their learning processes.

Experiential learning methodologies will be unpacked alongside manufacturing technologies, which worked very effectively within the design educational environment. Students are able to gain practical experience in the manufacturing process, work collaboratively, and solve real-world design problems.

Over the past few years, several manufacturing technologies have been adapted for use in the industrial design lecture environment, including Rotational Moulding, Injection Moulding, Sand Casting, and Press Forming. Machines, tools, and processes have been experimented with and adapted to be operated on a small scale. Practical examples of these adaptations will be presented, including design outcomes that students have developed through their own project undertakings.

The results of students being able to replicate the manufacturing processes in the classroom environment have proven to be extremely successful, with project outcomes effectively illustrating large, real-world industry manufacturing concepts through practical demonstrations. The students' understanding of appropriate industry concepts is evident in their theory research reports, which are submitted alongside their project outcomes. Students document their own design process with reference to industry processes, illustrating their effective understanding of the core principles.

The value of students being able to visit industry partners during their studies is extremely high, however, simulating large-scale processes on a small scale within the lecturing environment allows students to experiment and learn hands-on in a free and safe working space prior to heading into industry. Furthermore, these small manufacturing machinery and tools are able to effectively manufacture small products and components at a suitable quality for incorporation into real product outcomes.

Keywords: Experiential learning, industrial design, small-scale manufacture.

Introduction

Students in Design Education are equipped to enter their respective creative industries with an understanding of the associated technologies and processes within these creative industries. It is required that their skills and capabilities once they graduate are matched as closely as possible to the industries into which they will fit. In this paper, the teaching approaches within a specific department of Industrial Design will be unpacked with examples illustrating innovative teaching approaches allowing students to engage with small machines linked to industrial manufacturing processes. The development of several of these small machines and teaching engagements are part of a doctoral project undertaken by the author, the ethics of which have been approved by the Faculty Higher Degrees Committee.

The core teaching method, which will be unpacked alongside examples, is that of experiential learning, which allows and encourages students to 'get their hands dirty' with the process of learning manufacturing within the classroom. During their time within the higher education faculty, students need to be exposed to relevant technologies and processes. While visits to large-scale industries are sometimes possible, it is not possible to do this often due to cost and logistical implications, and the department sees merit in attempting to bring these processes into the classroom.

Experiential learning in design

Experiential Learning Theory is an approach to teaching and learning that was introduced in 1984 by educational theorist David Kolb. The experiential learning cycle is a four-step learning process that is applied multiple times in every interaction and experience: Experience – Reflect – Think – Act (Experiential Learning Institute 2023). Brooks-Harris and Stock-Ward (1999) expand on what was first introduced in 1984 by David Kolb, that experiential learning is a cycle of learning that proposes four learning modes: concrete experience, reflective observation, abstract conceptualisation, and active experimentation. It is proposed that this experiential learning occurs most effectively when all four modes in this cycle of learning are engaged with effectively.

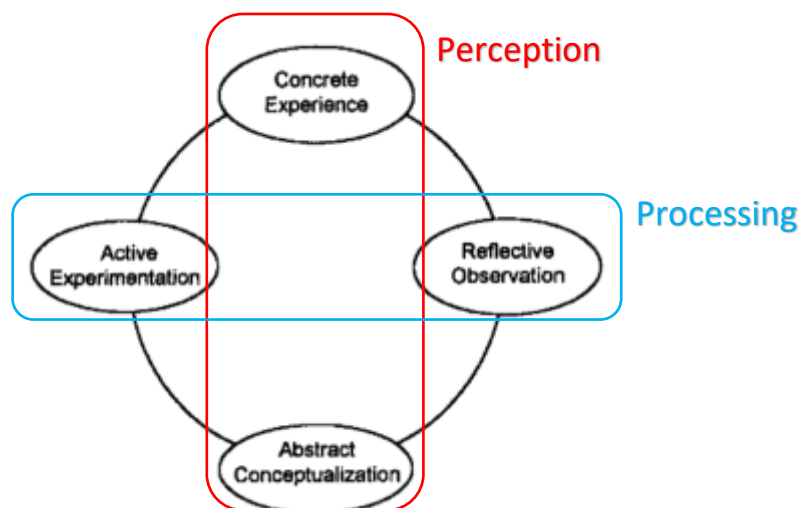


Figure 1: Kolb's Experiential Learning Cycle, Brooks-Harris, Stock-Ward (1999), adapted by Author

Of these four stages of a learning cycle, two primary steps stand out as core to the learning process. Concrete Experiencing of events, and Abstract Conceptualising (McCarthy, Brooks-Harris, Stock-Ward

1999). These were titled **perception**, linking to *concrete experience* and *abstract conceptualisation* and **processing**, linking to active experimentation and reflective observation. These have been highlighted in Figure 1. Through allowing students various methods of engaging with the learning material, it allows for different methods of learning to be grasped by students. Different students learn differently and touching on different ways of perception and processing can allow for a multitude of learning styles to be incorporated into lecturers.

It was highlighted in the foreword of *Diverse pedagogical approaches to experiential learning*, that good experiential learning with real-world issues is messy – and that is the intersection where good learning and good teaching reside (Lovett, K. 2022).

In the field of Industrial Design and neighbouring departments within the faculty, students, for the most part, are hands-on, and learning with practical engagement is a much better way to draw learners in, as opposed to digital presentations on-screen with a distance between the learner and the content.

With the delivery of theory modules within a largely practical course, how does one draw learners in, retain their interest, and have them actively engage with the lessons? Over the past few years, this question has been pertinent to a specific theory module relating to the Technologies associated with manufacturing processes in our department. In the past, almost all lecture content was delivered with the use of digital presentations and slides that have been altered year-to-year but did not seem to excite the students effectively. Generally, when one student falls asleep in a lecture, it is assumed that they have a lot on their plate and are tired [...], but when the third or fourth student dozes off, then it is enough evidence to point the finger at the lecturer and question the way in which they are delivering the lecture. Getting students involved with the content of the lecture, passing objects around, seeing in their hands what is being presented on-screen, and engaging with processes as depicted on-screen are all techniques that draw students in, and allow them to experience the content of the lecture in ways that are much more rewarding than lectures of the past. In Figure 2, a collection of students is receiving a technology lecture, but they have the opportunity to actively take part in the forming and manipulating of the materials, thus fulfilling the concrete experience and active experimentation aspects of Kolb's experiential learning cycle.



Figure 2: Students learning about moulds, press-forming experiments in class, image by Author 2023

Teaching manufacturing technologies

Lectures relating to manufacturing technologies require an understanding of large-scale processes that are being utilised in industrial sectors. Johannesburg houses one of the largest manufacturing sectors in Africa, and its manufacturing capabilities are extremely vast. The goal is, as much as possible, to expose students to these sectors with factory visits or projects collaborating with industry. With a defined theory lecture timeslot of only a few hours per week and a relatively large student body, it is difficult and often not possible to arrange site visits. Several industry contacts over the past year were approached and asked if students could visit, and many have indicated that smaller student groups are preferred. The ideal number is between six and eight people, to allow for a suitable group size to negotiate various factory operations whilst still being able to hear the discussions being relayed to students. Whilst splitting the 30+ student group down into four groups can allow for multiple trips, it does introduce excessive strain on the visiting factory, which is already sacrificing their capacity and time to assist with student tours. Splitting the groups into various factories also could be suitable, however, this again brings complexities for student management and safety.



Figure 3: Students visiting Rotational Moulding Factory 2019, department archive A. Marin

Practical-based projects that span several weeks allow for a more flexible timeframe and better student participation and collaboration. For instance, a keystone project undertaken annually with the second-year student body involves linking with the South African Association of Rotational Moulding. In this instance, the students are able to receive talks from industry partners as well as have walk-about tours in an identified manufacturing facility. This was possible with the Exam Project in 2019, with students visiting a Johannesburg-based Rotational Moulding factory (Figure 3). Again – the practical experience in the factory is invaluable for the Perception aspect of Kolb’s theory, and also allows for reflective observation of the moulding process.

Adaptive experiential learning during the COVID-19 pandemic lockdown

During the COVID-19 pandemic lockdown, lecturers and students needed to become extremely agile in the manner in which practical and theory teaching takes place, as no links to industry were possible, and trips to manufacturers could not be made during that time. Even a trip to the hardware shop became impossible for a relatively long duration of time. Innovative problem solving is central to the design thinking process, and there are many different approaches that the department and its lecturers tried when engaging with the learners to promote experiential learning. One of the first in recent years that stands out as ‘bringing manufacturing approaches into the teaching environment’ is the sand-casting of sample objects with grocery-store-bought supplies, which was adapted in April

2021. This was due to the difficulty of not being able to take students to factory visits during the COVID-19 lockdown. Students needed to learn about Sand casting with molten metal, as illustrated in Figures 4 and 5, which is a very hazardous exercise to try and replicate without the correct infrastructure. The molten metal must be poured into a cavity within a compacted sand mould. The cavity within the sand gets filled, and once the metal cools, the cast item is removed from the sand.

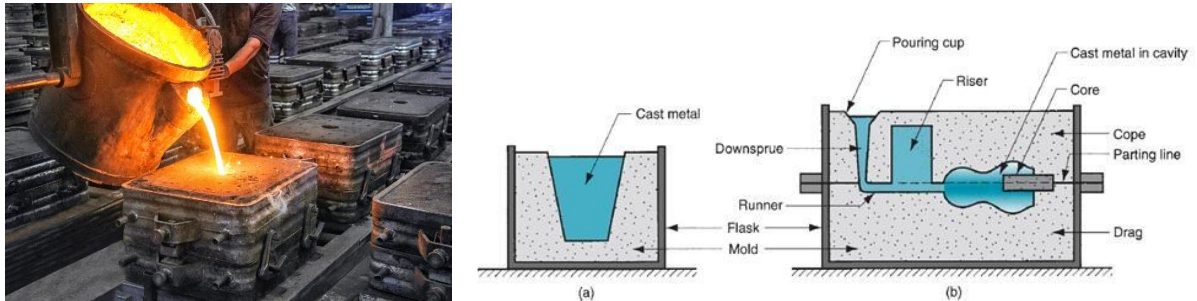


Figure 4: Left – casting molten metal with sand casting (Weld2Cast 2023)

Figure 5: Right – and casting process diagram (Engineering Product Design 2023)

Sharing online videos and photos of the process is able to effectively illustrate the process, but students inevitably miss out on the concrete practical experience aspect of experiential learning, which is such an important aspect of Kolb’s experiential learning process. In order to overcome this disadvantage, sand casting was experimented on at home, with standard grocery store items purchased from the nearby store, as lockdown restrictions allowed. Replacing casting sand with cornstarch and molten metal with jelly snakes allowed for an interesting experiment that could be replicated easily and safely. This is shown in Figure 6 below, with the melting of the jelly babies being undertaken on a hotplate on low heat.



Figure 6: Process of casting molten gum sweets in corn starch, photos by author 2019

This casting process was repeated in-person in 2022 and 2023 with students on campus, and proved to be a messy-yet-effective method of teaching casting, going hand-in-hand with on-screen lecture content. The positive responses from students regarding this Active Experimenting within their lecturing environment were extremely encouraging, and the goal was then to adapt other manufacturing theories to a more hands-on teaching, allowing for more Experiential learning within the taught modules.

Experiential engagement: Additional machines and tools in the classroom

Over the past few years, several manufacturing technologies have been taken a step further and adapted for use in the industrial design lecture environment. These allow for in-class Rotational Moulding, Injection Moulding and Press Forming. The development of these two kinds of machines is linked to a doctoral study in developing small-scale manufacturing technologies, and the small size of these machines allows for them to operate effectively within the teaching and workshop environment. The following presents three different examples where the machines were used linked to teaching and learning, yielding effective experiential learning outcomes with learners.

Rotational casting prototypes

The rotational moulding machine illustrated in Figure 7 is the outcome of ongoing staff research with the development of small-scale manufacturing machines. It was utilised for in-class demonstrating of the rotational moulding process, which can be described as the production process of forming hollow parts with resin, which coats the inner surface of a rotating mould (Roto Mold USA 2023). This is the process that can make large plastic water containers and even hollow chocolate Easter eggs. During the COVID-19 pandemic lockdown, this was only taught through the use of online images and sourced demonstration videos, however, with this physical machine, students have been able to manufacture their own tools and cast their own products. This machine allowed for students to see how the machine settings and rotational speed and duration affect the hollow resin cast outcomes. The machine is also made available for students when they complete rotational moulding design projects, and has been effectively used for prototyping design outcomes on a small scale, simulating the larger industry process. In Figure 7, a student design process is illustrated from concept to final rotational cast prototype made in a 3D printed plastic mould, which can be used for the small-scale production process.



Figure 7: Rotational moulding as part of practical design process, department archive, Erasmus (2022)

In-class injection moulding

The injection-moulding machine is an open source from Precious Plastics, a Dutch open-source design collection of plastic processing machines, and was fabricated in the department workshop several years ago by an alumni. It was only at the start of 2023 that the machine was commissioned and started being used with experimental tooling. The first tool that was made was a small mould to injection mould a small game stacking chip. This machine was introduced to students as part of a plastics manufacturing lecture, where they first received a theory lecture regarding the types of plastics and associated methods of processing. Wheeling in a trolley into the classroom with a machine, bucket of plastic, and odds-and-ends in a box makes for an interesting lecturer entrance and

immediately raises interest from the learners in the venue. The lecture trolley and engagements with the students are illustrated in Figure 8.



Figure 8: In-class injection moulding. Image by author 2023

What stands out with this engagement with the students was the variables to consider during the manufacturing process of injection moulding, being the cycle time between manufacturing objects, and the injection pressure of the machine, and the clamping force of the mould, all of which were able to be experienced hands-on in the classroom, which correlate to specific Large-Industry Injection Moulding considerations. Once the machine was introduced to the class, components were explained as the machine was heating up, and students were then invited to come and operate the machine. The small injection mould was bolted together with small fasteners, supplying the mould clamping force, followed by the hand-operated injection of the plastic and the holding of the pressure while the plastic cools within the mould. Lastly, the mould is removed and object removed from the mould. This is the same sequence in industry as moulds held together with clamping pressure, molten plastic is injected into the mould, and the holding and cooling time allow for the plastic to cool, after which the part is ejected (Essentra Components 2022).

Messy experiments with ceramic press forming



Figure 8: Press-forming clay with small countertop toggle press 'Little Squisher', image by Author 2023

The last example is the use of a small press-forming machine, which is again part of ongoing staff research into the development of small-scale machines. This is a hand-operated press that has been used for forming clay, pressing materials between mould halves, and also as a small printing press. For the in-class technology demonstration, it was used as part of a technology lesson about types of

mechanical fasteners and later in the semester for illustrating how low-cost plaster moulds can be used to press ceramic clay into forms. Once the forms are dry, they can be fired in a kiln, yielding a final manufactured ceramic product. An interesting experiment with pressing clay against a leaf resulted in the ‘printing’ of the veins of the leaf into the surface of the clay. This opened up the inquisitive doors of experimentation for students to use the press for different tests with different materials, and in turn utilise it for the manufacture of ceramic tiles as part of a core design Practice Project during the semester. With an early prototype like this, the failed tests with moulds (at the expense of the lecturer) help inform the decision-making of the students. This is evident in the multiple broken Plaster-of-Paris moulds in the central image of moulds prepared by the lecturer for the experiential demonstration. Students also provide comments and suggestions to the lecturer for trying to make the press or moulds better for future tests.

Practical lessons learnt, linking to manufacture process variables

Many of the considerations that affected the outcomes of the abovementioned in-class manufacture examples link directly to manufacturing considerations within associated manufacturing processes. For example, manufacturing variables that affect the quality of a component could be process pressures, temperatures, times, and speeds (Figure 9, Kuts 2005).

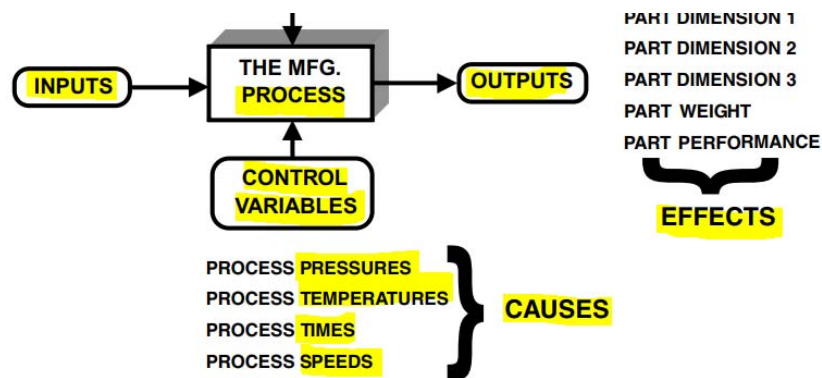


Figure 9: Process variables leading to output variables (Kuts 2005)

Variations in any of these can effect the output qualities. Students know this through their individual experiences.

What is exciting, though, is the natural inclination for students to question what the outcome might be if different variables are used. “*What will happen if more pressure is applied?*”; “*Can you use two colours at the same time?*”; “*Do you think this could work with natural bio-plastic?*”

The response I provide to the students is: ‘*I’m not sure, try it and see what happens!*’ and leave the machines with them, encouraging them to uncover and document their new experiences.

Some points from student feedback or reflections regarding these various examples that stand out are as follows:

- I would like to attempt to build one of the small machines.
- It opens up ideas to create tools and machines to help in the manufacturing process.
- It makes the class more interesting and fun, which leads to more people paying attention.
- It gives a more in depth and practical learning experience as opposed to learning with powerpoints, this is advantageous as industrial design is also a practical course.

Conclusion

The presented examples, and their alignment to both Experiential Learning Theory, and Manufacturing Processes, illustrate interesting and novel approaches to teaching manufacturing theories, practically, within the lecturing environment. What started as experimenting with cornstarch during the COVID-19 pandemic lockdown sparked interest in pushing boundaries with trying to engage more effectively with students in their individual learning journeys. Not only is it more engaging and interesting for the learners, it is also more exciting for the lecturer, constantly stimulating more ideas with how lectures can be delivered. The ability to teach students practically with the small-scale machines in the lecture rooms is providing extremely positive results. Increasing the collection of teaching machines to replicate each large manufacturing process can allow for the teaching environment to be considered a factory of mini machines for experimental product tooling and manufacture. The depth and manner in which students engage with theoretical teaching content is much more effective with the inclusion of experiential learning in the delivery approach. Students show evidence of grasping the theories, and process the information much more effectively than just digital in-class presentations.

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Vulindlela – making new pathways

17th DEFSa conference – 21|22 September 2023

Exploring student perspectives and challenges in engaging with decolonization in a private higher education institution in South Africa

Esther Martins, Inscape Education Group

Abstract

Decolonisation has gained significant attention within South African public higher education, fuelled greatly by the Rhodes Must Fall and Fees Must Fall movements of 2015 and 2016, with many institutions looking to address historical biases and promote a more inclusive curriculum. This pilot study explores student perceptions of decolonisation in an Interior Design programme within a private higher education institution (PHEI) in South Africa. While much research on decolonisation in higher education has focused on public institutions, little is known about its implications and potential differences in the context of private institutions. The research context is a for-profit PHEI that aims to be inclusive. The institution has incorporated decolonisation as one of the key themes in its centrally designed curricula. However, the extent to which students and lecturers engage with decolonisation and their understanding of its significance and impact within the field of Interior Design, remains unclear. This study aims to address this gap by exploring student perspectives and experiences regarding decolonisation in Interior Design education. The research design involves a mixed methods approach, combining quantitative and qualitative methods. Quantitative data is collected through the review of third-year theory teaching and assessment content, and a questionnaire survey issued to a sample of third-year students within the interior design programme. The courseware review explores what contexts students are engaging with while the questionnaire elicits participants' understanding of decolonisation and their experiences and challenges in incorporating decolonisation into design projects. The study finds that students define decolonisation as political independence and freedom from colonial influence, as well as challenging colonial ideologies and injustices. However, many students do not consider decolonisation relevant to their programme or their capstone projects. Reasons include a lack of interest or relevance, a focus on alternative topics, and limited knowledge or understanding. The need for continued meaningful conversations and engagement with decolonisation within the classroom is vital if interior design education is truly to be decolonised, resulting in teaching and learning practices that are more inclusive and equitable. This paper leans into the conference sub-theme of learning, investigating challenges and opportunities that arise in decolonising interior design education.

Keywords: Curriculum design, decolonisation, interior design education, private higher education in South Africa.

Introduction

The 2017 DEFSA conference titled #Decolonise!, hosted by Tshwane University of Technology and Inscape Education Group, was an opportunity for authors to consider “curriculum design, pedagogy and assessment as well as the broader role and objectives of higher education structures and systems” (Giloi & Botes 2017). The conference allowed for insight into who is grappling with decolonisation within the design education realm and what about decolonisation is currently being researched. Of the 26 published papers found in the conference proceedings, only two papers from staff members affiliated with a South African private higher education institution can be found. This is not conclusive but rather an indication of the private higher education institutions (PHEIs) participation in the decolonisation conversation.

The various South African research outputs with regard to decolonisation within higher education speak mostly to public higher education and little research has been conducted to investigate what decolonisation could look like in South African PHEIs and if it should it be different. This paper investigates what student perceptions of decolonisation are in an Interior Design programme within a private higher education institution in South Africa.

Interior design is concerned with producing spaces that engage with history’s impact on spaces and reflect the current times in both 2D and 3D. Spanjers (2013, p. 87-100) states that “the main task of the interior designer is to [...] design with complete affinity for human beings and their social and organisational behaviour, as active mediators between humans and their environment, between users and their everyday surroundings”. The production of current interior design artefacts can be said to be “physically located on the continent but epistemologically situated in Europe and America” (Ndlovu-Gatsheni 2013). The geographical and physical location of interior design education and practice, in contrast to Western-based epistemology, can create tension between preserving, celebrating, and generating contextually relevant interior design artefacts and catering to Western approval.

Private higher design education in South Africa: Institutional context and structure

The research context is at a for-profit, private higher education institution (PHEI). The lecturing body of the PHEI comprises predominantly of industry professionals teaching allocated sessions and more recently a shift to more permanent, full-time staff taking on the greater teaching load. The curricula are centrally designed and distributed to lecturers and students on multiple campuses. Lecturers are not directly involved in generating the academic content that is shared across all campuses but are relied upon to follow the supplied curriculum and to be a close link to industry, bringing the voice of industry into the classroom. Feedback from lecturers regarding the supplied curriculum is submitted through internal moderation and subject feedback reports. Unless a lecturer is actively engaging in industry with decolonisation or prompted by institutional training, decolonisation may not be something that they are familiar with or engage with deeply.

The current lecturing and student demographic is predominantly white, although the institution has in recent years actively sought to be more diverse and inclusive. These institutional objectives have now trickled into the designed curriculum, which incorporates the following themes;

1. Circular Economy
2. Decolonization
3. Human-Centred Design

4. Imagined Futures
5. Subcultures
6. Sustainable Design

For this centralised, supplied curriculum, a myriad of selection and quality assurance processes happen at each stage and the criteria for inclusion are informed by councils and bodies such as the CHE, industry requirements that affect employability and the filter through which a faculty Dean is reviewing the developed course content. Although some criteria are objective, there is still a level of subjectivity when it comes to more polarising concerns such as decolonisation. This study serves as a pilot investigation, aiming to initially explore student perceptions of decolonisation in an Interior Design programme within a private higher education institution in South Africa, with the next phase planned to investigate lecturers' perceptions of decolonisation at the PHEI.

Background of the study

The pilot study focuses on two programmes currently running at the PHEI, namely the Bachelor of Design specialising in Interior Design (BDes ID) and the Bachelor of Design specialising in Environmental Design (BDes ED).

The BDes ID programme at the PHEI focuses on planning environments that cater to the psychological, emotional, and physical needs of people. Students learn about emerging technologies, products, and services, as well as the latest software used in the field. The programme aims to develop graduates who can create interior design solutions for various industries such as retail, hospitality, domestic, exhibition, services, corporate, and specialist sectors.

The BDes ED programme is centred around designing for the interior environment and considering the future needs of the world. Sustainability and Green Design are key aspects of the programme. Students learn about designing sustainable buildings, planning green spaces, and implementing the latest technologies and materials.

The structure of the three-year programmes incorporates a generic first year, providing students with a comprehensive foundation for exploring the multifaceted nature of design. The subsequent second and third years offer opportunities for specialisation and in-depth focus within specific design disciplines.

The subject of concern in this article, Visual Communication, which is integrated across disciplines throughout the three-year programme, serves as a theoretical framework to cultivate essential critical skills in visual communication and design practices. Its primary objective is to equip students with the necessary tools to navigate the complexities of the visual world and actively participate in meaningful interactions within a dynamically evolving design sector.

The pilot study will make use of this subject as a source of quantitative information on student engagement with decolonisation as a context. The subject at third-year levels asks students to engage critically with media, images, power, and cultural production, to name a few.

Decolonization efforts at the PHEI

“Continued discussion on decolonisation is considered relevant in facilitating the process of ‘unlearning’ and ‘unthinking’ “(Muchie, Lukele-Olorunju & Demissie 2014, p. v, as cited in Newport 2018). Monchalin (2016) cites Michael Yellow Bird as defining decolonisation as “restoration of cultural practices, thinking, beliefs, and values”. When we consider current students in PHEIs, their

cultural practices, thinking, beliefs and values that are imparted, taught and learned in various contexts, the need to unlearn and unthink becomes vital, especially in spaces such as PHEIs, that may cater to a more privileged student and lecturing body. Efforts to decolonise the curriculum at the institution have remained in the content of the subjects taught. The content of key theoretical subjects that deal with constructs has provided an avenue to include the topic of decolonisation. Although this is a start, it is critical that there is a cohesive and continued deliberate mission to decolonise. The institution engages with lecturers in regular training sessions that allow the facilitator to address various topics within teaching and learning, decolonisation being part of this. In these sessions, lecturers engage in discussion with one another and the facilitator about how the various training topic informs their teaching practice.

The article 'The "decolonial turn": what does it mean for academic staff development' by Jo-Anne Vorster and Lynn Quin (2017) was key in raising questions regarding programme content development, the status of decolonisation, what the implementation of decolonisation would look like and how one could enable and support lecturers to teach a decolonised curriculum. Glatthorn et al. (2012) outline that there are various types of curricula, namely the recommended curriculum, written curriculum, supported curriculum, taught curriculum, tested curriculum and the learned curriculum. It is imperative to consider from an institutional perspective if the various types of curricula continue to be the "apparatus that is perceived to support and continue a colonial legacy" (Council on Higher Education 2017) as "the master's tools of colonisation will not work to decolonise what the master built" (Smith 2012). The conversation on decolonisation within higher education in South African context cannot leave out the impact of the Rhodes Must Fall and Fees Must Fall movements of 2015 and 2016, which were pivotal in turning the decolonisation conversation into action. The movements "sought to challenge a colonised education system" (Nengwani 2021).

In the Department of Higher Education and Training (DHET) 2023 report on the progress of transformation in South Africa's Public Universities, no private institutions are reviewed. Although transformation is conflated with decolonisation or erroneously used interchangeably, the lack of the DHET's engagement with private institutions in the area of transformation is concerning. While reviewing the latest DHET annual report, data shows that in 2021 there were 124 DHET registered PHEIs with enrolment figures steadily on the rise, having grown from 103 036 students in 2011 to 232 915 in 2021, when looking at 2020 and 2021 PHEIs enrolment had increased by 6.3% (DHET 2023, p. 30). These enrolment numbers cannot continue to be ignored, as every number represents a student engaging with a written curriculum. Whether or not the respective institution considers decolonisation as something worth engaging in is a mystery. Vital in this conversation of the curriculum and the decolonisation of it is the student. Le Grange et al. (2020, p. 44) state that "a complicated conversation about decolonising the university curriculum cannot take place without the input of students". This is echoed by Hlatshwayo et al. (2022, p. 3) who state that "a knowledge-building approach is crucial for responding to the call to decolonise".

Research methodology

The pilot study makes use of a mixed methods research design, integrating both quantitative and qualitative approaches, to investigate student perceptions of decolonisation in interior design education. Quantitative data was gathered by initially reviewing the shared third-year theory subject courseware and identifying a project that allowed students to engage and select a research context from a predefined list. In this project, students are asked to write an argumentative essay of 2000 – 2500 words on one of the contexts listed:

1. Circular Economy
2. Decolonization
3. Human-Centred Design
4. Imagined Futures
5. Subcultures
6. Sustainable Design

The argumentative essay is meant to persuade the reader that the chosen context is crucial when recognising and addressing a design problem. The contexts selected from the project tell of what is considered significant for these future designers.

The listed contexts are expounded upon in the courseware content provided with links and resources that students can engage with. A review of student submissions made in 2023 and the chosen contexts provide data on what students are engaging with.

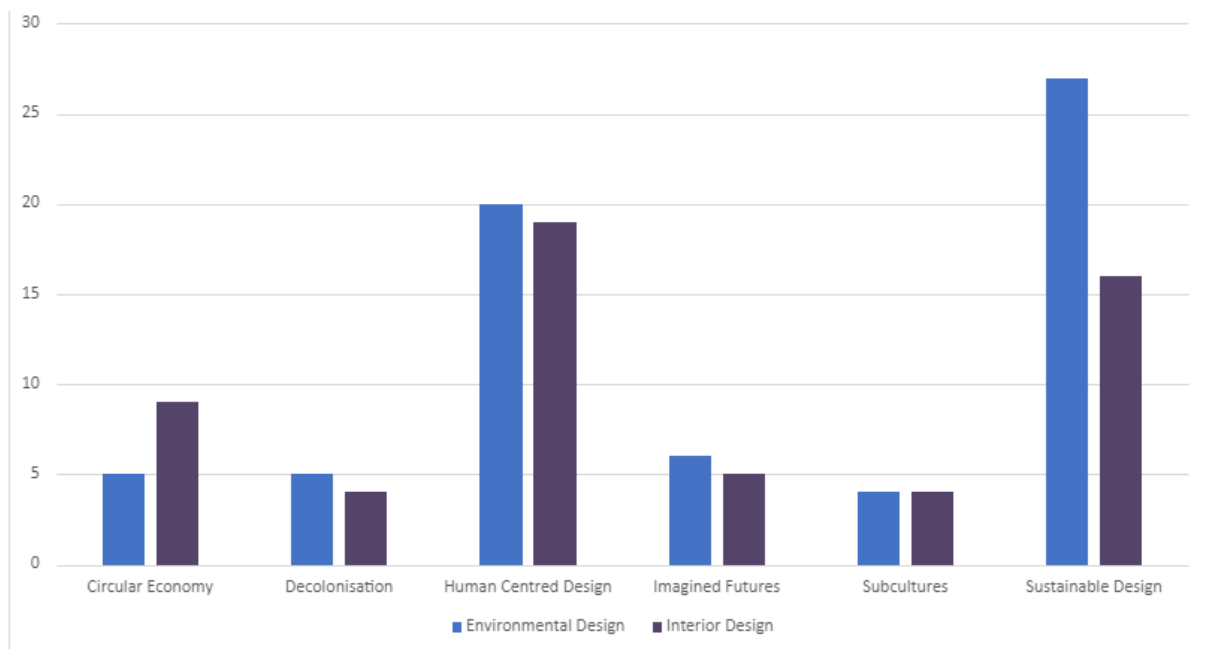


Figure 1: Context selection overview across in both BDes ED and BDes ID programmes

In Figure 1, it is evident that the Bdes ED students exhibit a strong inclination towards the sustainability context, with 40.3% of students selecting it as their preferred context. Conversely, subcultures received the lowest percentage of 5.9%. The substantial proportion of students opting for sustainable design aligns with expectations, considering their engagement with sustainability as a focal point in their specialisation over the past year and a half, indicating their familiarity with the subject.

Regarding the BDes ID students, the highest level of interest is observed in human-centred design, with 33.3% of students choosing it as their context of choice. Conversely, the lowest percentage for the chosen context in this programme is evenly distributed between subcultures and decolonisation.

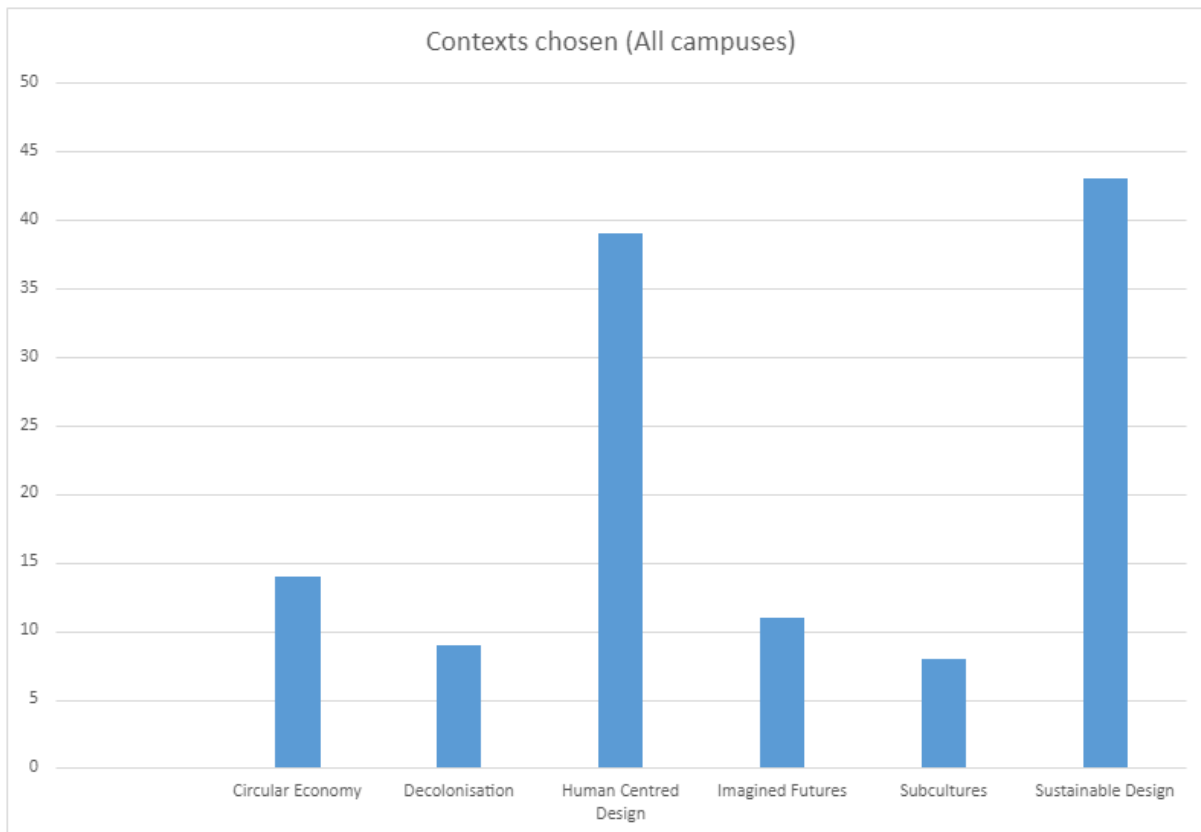


Figure 2: Contexts chosen across both programmes on all campuses

Among the 124 student submissions surveyed, the distribution of chosen contexts is as follows:

- Circular Economy: 14 students (11.3%)
- Decolonization: 9 students (7.3%)
- Human-Centred Design: 39 students (31.5%)
- Imagined Futures: 11 students (8.9%)
- Subcultures: 8 students (6.5%)
- Sustainable Design: 43 students (34.7%)

In reviewing the selected contexts among the student submissions, Sustainable Design emerges as the most selected context, with a significant percentage of 34.7%. Conversely, Subcultures stands as the least selected context, 6.5%. Notably, Decolonisation closely follows Subcultures, with 7.3%. This low uptake warrants further attention and analysis.

A second step in gathering quantitative data was issuing a questionnaire to third-year interior design and environmental design students. The questionnaire was comprised of a combination of closed-ended and open-ended questions. It aimed to elicit participants' insights regarding their understanding of decolonisation in interior design and experiences of incorporating decolonisation in design projects. The quantitative approach provided data, enabling numerical and thematic analysis.

The questionnaire asked students to indicate the context chosen in the theory project. There were 22 students who responded, with varying numbers of students selecting different contexts. Among the choices, Sustainable Design and Human-Centered Design were the most popular, with seven students

each, while Decolonisation, Imagined Futures, and Circular Economy were selected by 2, 4, and 2 students, respectively.

When asked how they would define decolonisation in their own words, a number of students either offered a copy-paste response that already exists without citing it or paraphrased a definition that they had come across in their course content. The themes that emerge from the student responses are:

Political independence and freedom from colonial influence

In this theme, students referred to phrases such as “independent of the colonising country”, “Decolonisation is the process through which colonies gain independence from their colonial countries. The action of decolonisation was predominantly defined as a process which echoes Gatsheni’s work, which refers to decolonisation as “a historical process [...] redemptive and liberatory” (Ndlovu-Gatsheni 2013, p. 13).

Challenging colonial ideologies and injustices

In this theme, students offered definitions that spoke to “dismantling colonial systems, structures, and institutions”, “addressing the historical injustices”, “creating a world more inclusive”.

In the larger definition, students used the term ‘process’ as a present participle, speaking to the students’ understanding that decolonisation is not an event but rather a series of events not only in the past but also continuous actions related to decolonisation.

When asked about the relevance of decolonisation to their programme, out of the total respondents, 54.5% answered “no” and 45.5% answered “yes”. This question was followed up by querying if the student plans to engage with decolonisation for their third-year capstone project. Out of the total 22 students, 86.4% answered “no” and 13.6% answered “yes”. Students who responded “no” were asked to share why they would not consider decolonisation as a context for their capstone project. Based on the responses given, the following themes emerge.

Lack of interest or relevance

“I do not find the topic interesting or relevant enough”,

“I find that it has nothing to do with my degree”,

“I am not disregarding decolonisation; however, I personally feel that contexts such as Sustainable design, circular economy have more importance to me in the designing of buildings and spaces”.

The lack of interest is understandable but not understanding the relevance of decolonisation within Interior Design is concerning.

Focus on alternative topics

“I want to focus more on designing a green, sustainable building by implementing something more unique”,

“I have chosen to focus on imagined futures and UX design”.

Limited knowledge or understanding

"I have not researched it enough", "I don't understand it well enough", "I am not confident in my knowledge about decolonisation to now create my final project around that subject – where I will choose a topic I know about and have a lot more information about".

"As someone who's White, it's a difficult topic to approach as it can come off as a colonial trying to dictate what decolonisation should look like".

"No, I feel I was not educated enough on this topic. And don't want to talk about a political issue".

Students additionally spoke about complexity and multiple variables that decolonisation deals with and the lack of confidence in dealing with this.

The response rate for the questionnaire distributed to 132 currently enrolled students across both programmes was disappointingly low, even for a pilot study. Only 25 students (19%) provided their input. Out of the 25 students who completed the questionnaire, five students expressed their willingness to participate in the focus groups. However, during the process of contacting and arranging the focus groups, one student withdrew their participation, while three students did not respond or engage further. As a result, only one student actively participated in the subsequent semi-structured interview.

The intention for the focus group, which consisted of students who had indicated they intended to explore the decolonisation context, was to make use of semi-structured interviews to encourage students to further describe their experiences and perspectives on decolonisation. Due to the limited number of participants willing to participate in the semi-structured interview, specifically only one student, the available data was insufficient for comprehensive analysis within the scope of this research article. The lack of participants in the pilot study indicates that the approach may need to be reconsidered when conducting further research.

Reflection on findings

The findings from the pilot study on student perceptions of decolonisation have several implications for both the curriculum and the broader conversation on decolonisation in the field of interior design. The lack of interest, limited knowledge, and perceived irrelevance of decolonisation among some students highlight the need to incorporate decolonisation as not only a central theme in interior design education but as something inherently fundamental to the curriculum.

The curricula being developed need to consider decolonial perspectives, theories, and practices associated with colonial legacies in design. In challenging the dominant design and specifically interior design narratives, a more inclusive and culturally diverse design practice could be promoted. The integration of case studies and guest lectures would assist in exposing the students to real-world examples of the relevance and impact that decolonisation has in interior design.

Of vital importance in the complicated and sensitive conversations regarding decolonisation is the lectures' role in creating a safe and inclusive learning environment that encourages open dialogue, self-reflection, and understanding of diverse perspectives. These conversations can empower students to challenge colonial ideologies and design alternative futures that prioritise diversity, equity, and decolonial perspectives within the field.

Conclusion

The analysis of student perceptions of decolonisation revealed various themes that shed light on their understanding, views, and attitudes. The students express awareness of the complexity of engaging with decolonisation but are unable to integrate decolonisation into the projects they are working on due to a lack of understanding of decolonisation and confidence in engaging with it. Understandably, not all students would be interested in grappling with decolonisation in interior design projects, but students not finding the relevance of decolonisation in interior design is concerning. It is essential to address students' limited knowledge and understanding while fostering a deeper awareness of the relevance and implications of decolonisation within the field of interior design.

As a pilot study, the findings have limited application and generalisability, and as mentioned previously, adjustments to a full research study may be necessary. The limited response rate of the questionnaire and participation in the focus groups and interviews not only posed challenges in obtaining a comprehensive understanding of student perceptions but raised questions regarding students' willingness to engage with decolonisation. These findings emphasise the need for further exploration and education on decolonisation within the academic programme. The institution currently follows a centralised approach to curriculum design, which could be experienced to be a top-down approach by lecturers and, ultimately, students in integrating decolonisation within what is taught and how it is assessed. Engaging students in complicated conversations regarding decolonisation would allow for a more consultative approach, where they are engaging in the development of the curriculum rather than passively having the curriculum enacted upon them.

The pilot study has revealed some challenges in engaging students in the conversation of decolonisation, should any further data collection take place, the researcher would need to reconsider the research methodology and tools in order to elicit a greater number of responses and richer engagement. Although strides have been made in decolonising the interior design programme curricula at the PHEI, it is apparent that the relevance of it is still not understood.

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Architectural artisanship skills development strategies implemented through architectural design studio projects focused on process

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Abstract

Design education is an integral part of the architectural student's journey. Traditionally, in the undergraduate course, emphasis is placed on the skills development of conceptual sketching, model making, storytelling, and various communications of the concept and design processes. However, these skills are often seen as separate parts and taught as such without always utilising the opportunities to integrate these various aspects and parts into a holistic process. Architectural artisanship is a vital part of design acumen and must be seen as a skill that facilitates the design process rather than a separate entity. For the 2022 Architectural Design III module, Bachelor of Architecture degree third-year of study, at the Tshwane University of Technology, South Africa, the project briefs are conceptualised to emphasise developing the artisanship required for architectural design. This is done through mandatory design process work presentations towards successfully addressing the outcomes of project briefs. Student outputs provide the data analysed to present the findings of this paper. The findings presented indicate a noteworthy improvement in the design process of the students. As a response to various design generators and variables, the architectural process is a nuanced journey with many feedback loops and development stages with multiple design iterations. The final design proposals improved as a result of students' use of process tools such as conceptual drawing, model making, storytelling, and other techniques of communicating the process. This paper presents an outline of these processes and a critical appraisal of what worked more effectively or less effectively. The findings are significant and as such research documented and presented becomes a benchmark for further development of undergraduate design courses for architectural learning sites.

Keywords: Architectural artisanship, design studio, design process, skills development.

Introduction

This paper presents teaching strategies to achieve architectural artisanship skill development in the 2022 Architectural Design III module for the Bachelor of Architecture degree in the third year of study at the Tshwane University of Technology (TUT), South Africa. Data, in the form of a selection of students' submissions for the concept development stage of the projects, is presented, analysed, and discussed as findings.

What is discussed in this paper is not a new pedagogy but rather a recharter of an old pathway, so that it may be rediscovered and retaught. Since the ascent of computers as a representation tool for the architectural process, teaching has declined of skills such as free-hand drawing, model making, and storytelling (Taraszkiwicz 2021). This paper presents findings on why hand-eye coordination is essential during the conceptual stage of a design process (Ceylan 2020). The paper advocates for a balanced approach between computer-aided and hand drawing, whereby eye-hand coordination drawing and making dominate the design process.

Literature review

Design education is an integral part of the architectural student's journey. Traditionally, in the undergraduate course, emphasis is placed on the development of conceptual sketching, model making, storytelling, and other artisanship skills for communicating the concept and the design process. Architectural artisanship gives rise to design understanding and must be seen as a tool that facilitates the design process rather than a stand-alone proficiency. A student who has developed such skills has a better chance of becoming a design artisan, having mastered techniques for solving architectural problems (Ceylan & Soygenis 2022).

This paper focuses on the concept development stage of the architectural process, which is at the start of the architectural or creative process of a project. The concept development stage of the architectural process is followed by the design development stage and the design resolution stage, as indicated in Figure 1.

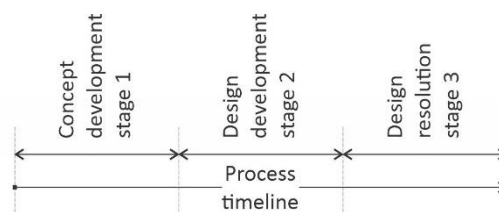


Figure 1: Three stages of the architectural process with a timeline

Figure 2 below shows the following artisanship skills fundamental for students to navigate the architectural design process: conceptual sketching, model making, and storytelling. If these skills are seen and taught as separate modules or units, students often find it difficult to integrate them into a holistic design process.

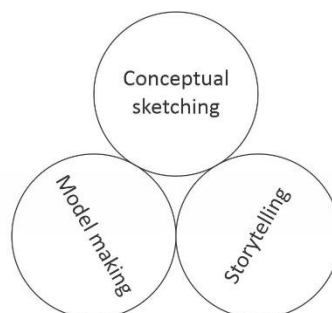


Figure 2: Three artisanship skills: conceptual sketching, model making, and storytelling

Conceptual sketching

Le Corbusier (Charles-Édouard Jeanneret-Gris 1887 to 1965) famously stated:

I prefer drawing to talking. Drawing is faster, and leaves less room for lies (Ricci 2023).

Conceptual sketching is the human action of conceiving an idea and formulating it on paper by way of rough free-hand drawing. Such sketching dates back millennia to cave paintings that were used to record and tell stories. Design professionals use conceptual sketching when solving problems and communicating ideas to others. It is the launching point for an iterative design process made easier by the act of roughly and speedily drawing up ideas on paper.

According to Pieters (2023), sketching allows one to communicate or dramatise ideas much faster. Architectural students are taught conceptual sketching in most undergraduate courses in modules such as presentation techniques and design. Sketching is often taught along with model making and storytelling to communicate the architectural design process. This study views conceptual sketching as the principal and antecedent skill in architectural artisanship. Conceptual sketching is a precursor to architectural drawing and architectural draughting, and should not be confused with architectural drawing, as indicated in Figure 3.

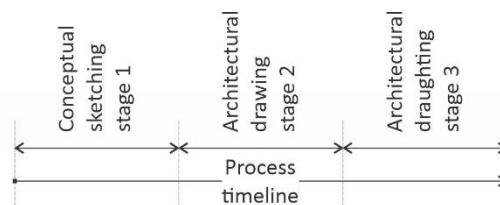


Figure 3: Timeline with three stages of pen and pencil to page, namely sketching, drawing, and draughting

Model making

Model making is the human action of building a smaller-scale, 3D proposal prototype. According to Smith (2007), the architectural scale model is created as a means to design buildings and define built culture. Calvino (1998) argues that a scale model is a mechanism for creating a definition between chaos and design. Thus, the model serves to concretise architectural ideas that would otherwise remain fluid and fragmented in the mind of a designer. A model offers architects an understandable way to develop and define their concepts (Garner 1980).

Model building supports the iterative process (Afify et al. 2021). A process model, known as a maquette, is usually built from cardboard, paper, wood, wire, and various other materials that are quickly assembled by hand using a cutter knife and glue.

Model making plays a crucial role in translating a design idea into something tangible during the design process. For each of the stages shown in Figure 1, there is an appropriate model type, as illustrated in Figure 4 below. Stage 1 is the concept development stage of the architectural process. Models for this stage are most effective if they are quick, rough, handmade, and explorative, as working models that can change and easily evolve. Stage 2 requires design development stage models that are often made to an accurate scale, albeit at a small scale (such as 1:10000 or 1:1000), built more neatly, and especially effective if placed in a similar-scale context model (showing existing project site features such as contours, and existing buildings, among others). In the design resolution stage, Stage 3, a final model or a detailed model is built, this time at a larger scale than Stage 2 models (such as 1:500, 1:100, or even 1:20).

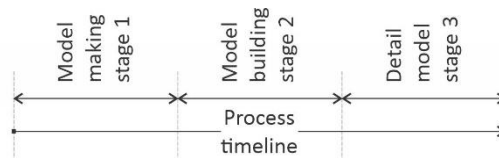


Figure 4: Timeline of the three stages of producing models, namely model making, model building, and detail building

The purpose of an architectural model is to convey, investigate, and represent specific features and aspects of a proposed building design in ways that drawings or even CAD models might not. Its impact lies in the effective, agile, and unlimited exploration of space and form during the early stage of the design process. Models offer a quick and easy potential of communicating an idea through a physical 3D form. Model building allows ideas still forming to reveal themselves for refinement and for further opportunities to be identified, expressed, and developed further through the process of making.

Storytelling

Human beings are storytellers (Boyd 2018), a trait that distinguishes them from other animal species. The earliest known record of storytelling through pictures dates back 44000 years (Aubert et al. 2019) to a cave in Indonesia. In addition to pictures, a story could be told in voice, words, dance, song, video, sketching, animation, writing, painting, drawing, model building, or any other medium.

A story consists of several parts that form a sequence of events. A well-narrated story succeeds in tying the parts together, where one part leads to the next. In any good story, the intrigue, drama, composition, and punchline must be presented confidently, even elegantly (Huang & Grant 2020).

Storytelling applies to the development of a design proposal. A narrative design presentation should unpack the context, objectives, influences, and informants of a project. This exposition can provide a clear understanding of the final resolved design proposal and portray the essence of the design process, communicating both the functional and emotional aspects of the project synchronously.

Iterative process

A design activity is an iterative process with feedback loops and the development of ideas accompanied by refinement. Jonassen (2008) argues that the simultaneous constraint satisfaction and propagation make design an iterative process. Maier and Störrle (2011) present data showing that iteration is the most important characteristic of the design process.

An iterative process “involves repeating a process or set of instructions again and again, each time applying it to the result of the previous stage” (OED 2023). Figure 5 below shows how a design iterative process draws repeatedly on the integration of conceptual sketching, model making, and storytelling. This process consists of proposal presentation, communication, and design review criticism from peers and mentors.

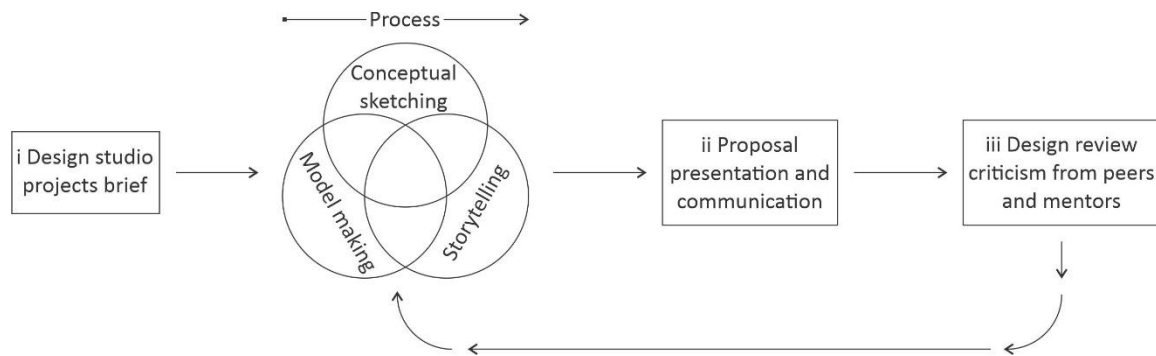


Figure 5: Conceptual sketching, model making, and storytelling integrated within an iterative process

Proposal presentation, communication, and design review

Consistent, constructive criticism from design studio instructors and peers is crucial during the design process to prompt students to refine and develop their design projects. Crucial decisions often result from design studio review discussions. These discussions aim to improve and develop a concept until its fruition as an architectural proposal. During a design process, aspects or issues that need attention often emerge, but students may be too oblivious or complacent to resolve them.

By responding to criticism, students make decisions that may give rise to further iterations of the proposal. Decisions compound or follow one another, and are interrupted by inquiries or criticism of the proposal. Therefore, the ability to effectively present their design process to studio instructors and peers is indispensable for their development and growth.

The students' architectural artisanship must be applied effectively and with agility. They should have the know-how to adjust the speed of design, applying techniques that require minimal effort, as required, to accommodate the changes within a given time constraint of a project. The premise of this paper is that the artisanship of conceptual sketching, model making, and storytelling are three such skills that students can deploy in this instance. These skills are, however, in stark contrast with computer skills that are efficient but lack effectiveness.

Holistic, integrated process

This study addresses a skills development gap resulting when architectural students do not effectively integrate conceptual sketching, model building, and storytelling when designing. One of the contributing factors to the lack of integration is that sometimes, students skip the concept development phase that calls for hand-eye coordination. Instead, they jump straight into computer-aided draughting (CAD). Hands-on learning at the design concept development stage, without or with fewer technology aids, enables a better understanding of key aspects of a visual-spatial project (Chong 2023).

Based on observations in the TUT third-year architecture studio, if students are not encouraged to use conceptual sketching, model building, and storytelling early in the concept development phase of the architectural process, they usually default to relying heavily on CAD. This restricts design exploration, resulting in a lack of and/or poor iteration of proposed solutions. CAD requires time-consuming precision when inputting drawing perimeters, yet it usually yields poorly resolved design solutions.

Layering, through the iterative process, is necessary to deepen and enrich architectural design proposals. Conceptual sketching, model building, and storytelling (with limited computer use during

various parts of the design process) often lead to more refined and considered design solutions. These skills can be used interchangeably to express developing design ideas when required.

Complexity of design

Architectural design is a complex and multilayered problem-solving process (Silber 2007). Frampton (1995) argues that there are three sources of legitimacy in architecture: *tecton* (the art and science of construction and, according to Porter (2004), the artistic expression of construction); *typos* (referring to type); and *topos* (referring to site). Van Tonder (2022) argues that these three may be further broken down into six sources, namely visual tectonics, technology tectonics, natural typology, cultural typology, and the type of building falling within a linear or a circular economy production and use.

An architectural design process should also consider emerging variables that mitigate climate emergencies, such as climate resilience adaptation, redress of imperialism, system interception, fairness, and regenerative potential. In addition to project briefs, these variables act as design generators, which in turn call for a building programme. Students are expected to process and design for several different considerations and find a balance towards an appropriate proposal. This task is daunting and overwhelming, often resulting in ‘designer’s block’.

Pieters (2018a; 2018b) outlines the following six steps (Figure 6) to ‘get rid of designer’s block’ in the course of preparing architectural design solutions: 1) define the problem; 2) gather the information; 3) analyse the problem and the information and brainstorm the case; 4) develop solutions; 5) gather criticism and self-evaluate; and 6) improve. These steps are components of an architectural design iteration. This creative process is facilitated by the artistry of conceptual sketching and architectural drawings and these six steps could be considered a guideline for the architectural process (van Tonder & Stander 2022).

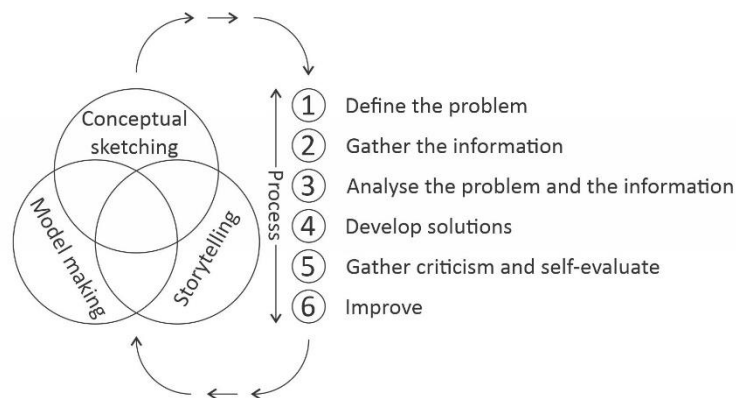


Figure 6: The six-step iterative process

Hand-eye coordination uses free-hand drawing, which is important to unlock creativity and the potential of design thinking. Free-hand drawing, making with hands, and creating a design narrative is discussed in seminal literature by Edwards (1989) and Pallasmaa (2009). Drawing by hand is a pertinent discussion in an age where design professionals increasingly use computer assistance to draw.

Methodology

Skills development strategies in an architectural design studio

The TUT third-year architectural design studio projects used for this study were composed to foster and develop the fundamental skills architects require to perfect their craft. This was achieved by introducing intermediate studio one-to-one presentations (known as 'crits') of the students' design process work. In addition to providing student-based feedback, studio instructors clarified project briefs and deliverables during these crits. The observations and findings of the study may be useful to studio instructors when developing curricula and pedagogies.

Data collection from architectural design studio projects

Some theories highlighted in the literature review section, such as hand-eye coordination, were tested in the design studio through teaching practice. Qualitative improvements were observed in the design products of the students who applied process tools (conceptual sketching, model making, and storytelling). The architectural process in response to various design generators and variables is a nuanced journey with many feedback loops and development phases with multiple design iterations.

An assessment rubric that indicated a breakdown of each process tool was used to allocate marks during the interim crits. No marks were allocated during the concept development stage crits for computer-aided drawings; with the exception of using quick rescaling or collages on Microsoft PowerPoint, or technology-aided presentation techniques such as physical model photographs layered with free-hand concept sketching in Photoshop, among other uses.

Findings and discussion

Case Study 1

Case Study 1 presents observations gathered from a selected student's portfolio submitted for the in-studio sketching exercise. The exercise took place after a tour of the physical project site by all the third-year architecture students.

The following observations were made from work submitted for the **in-studio sketching exercise, as shown in Figures 7(a) to 7(h)**:

- a) Use of free-hand drawings allowed the student to quickly put down their initial idea relating to the arrangement of space on the project site in relation to the proposed circulation.
- b) Free-hand drawings of proposed building sections were effective when resolving spatial layouts, forms, and building programmes.
- c) Following the documentation of the site, the design generators and end-user needs were identified, resulting in the first and early building design forms. Free-hand drawings in the form of rough plans and sectional drawings were used to explore building envelope shading devices and overhead planes.
- d) Section drawings were used to explore possible relationships or links between the proposed building and a water body (indicated in blue) from various positions on the project site.
- e) When analysing a site, documenting and communicating findings using only one graphical representation medium is often difficult. Typically, plans, sections, and perspective drawings depict various aspects of a building or site. This student managed to communicate the context of the project site, representing a sense of the topographical qualities of the site. This communication was achieved through a hand-drawn section drawing incorporating a photograph of the portion of the site where the section line is positioned.

- f) Hand-drawn perspective drawings allowed this student to visually express the characteristics of particular parts of the site deemed important for someone viewing the work to notice and understand. Hand-drawn analytical diagrams complemented the images and drawings shown. Images incorporating computer-assisted graphics and hand drawings successfully and documented on the site, whereby photographs were used to give a realistic rendering of the atmosphere of the place.
- g) Students were tasked with documenting their site and journey to the site through small drawings. This work shows how the task encouraged students to be reflective and focus on developing a site inventory of elements, issues, and opportunities identified as key to addressing and resolving design problems.
- h) The student used the drawings shown here as a reminder about the core design focus of the project. This helped the student frame a design intent through influences seen and experienced during the project site visit and site walk. This free-hand drawing allowed the student to document and express aspects relating to scale, spatial use, and the site vegetation and topography.

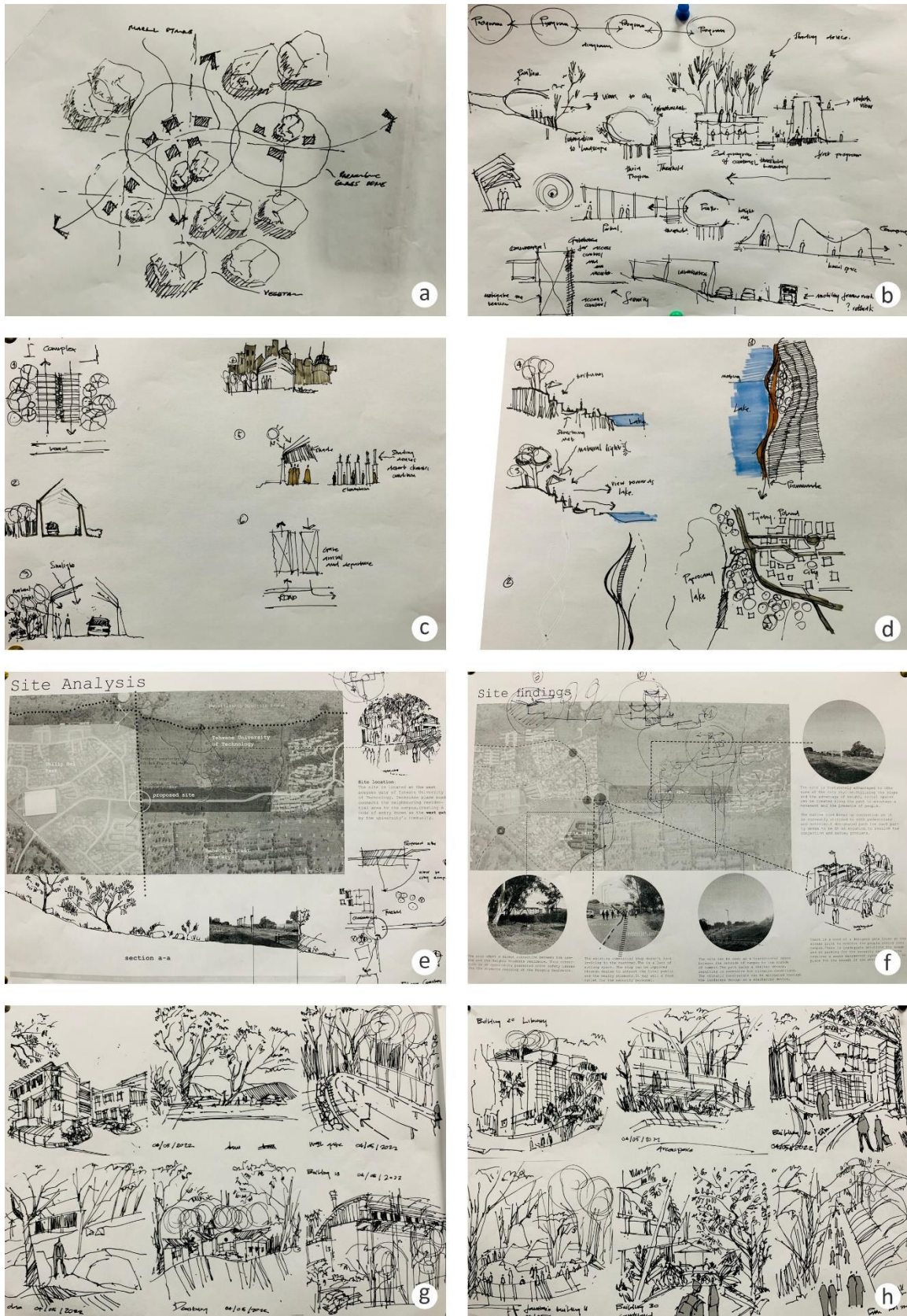


Figure 7: Case Study 1 shows conceptual sketching as the dominant artisanship utilised for the architectural process

Case Study 2

Case Study 2 presents examples of third-year students' model building for the concept development stage and model use in proposal presentation.

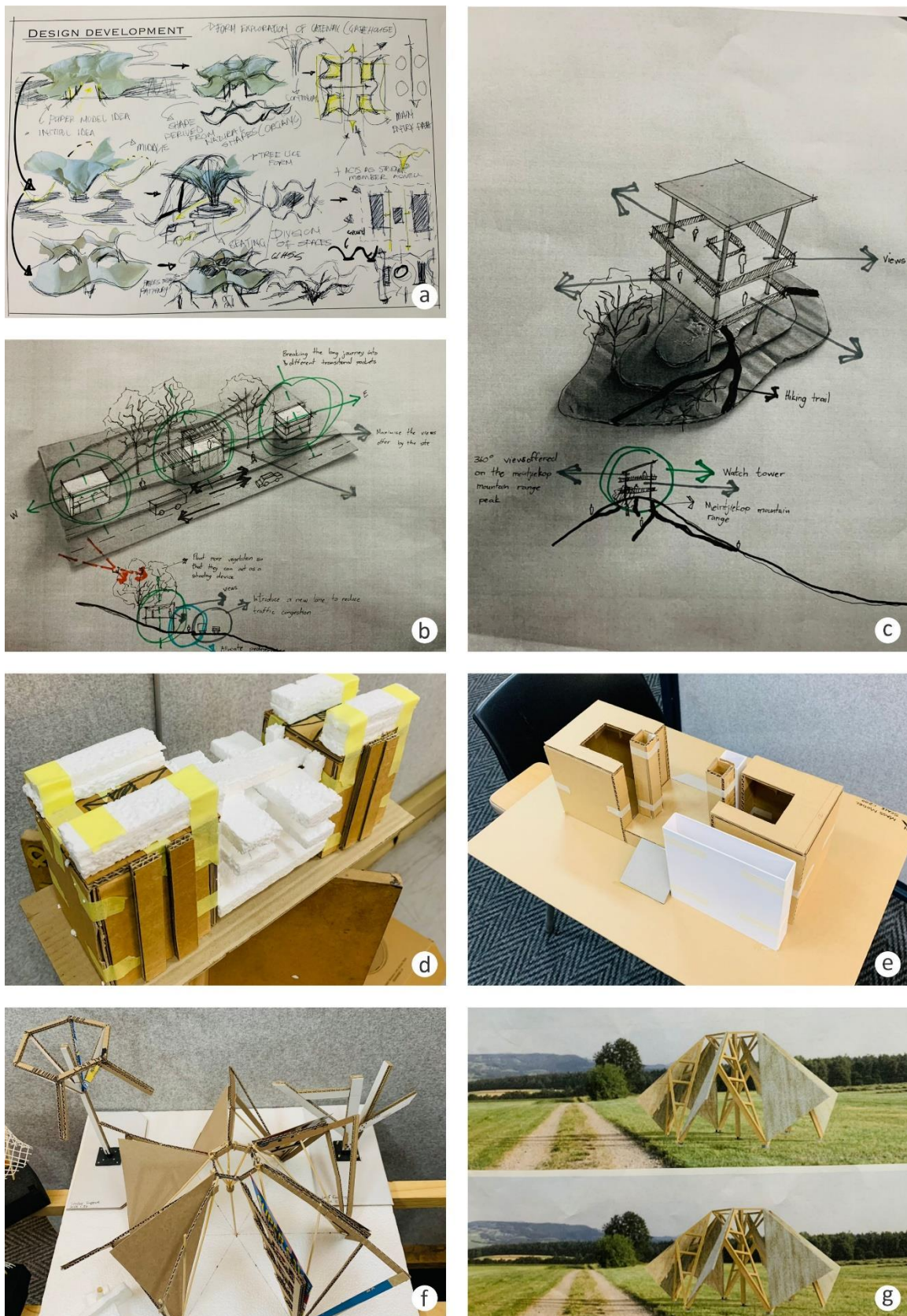


Figure 8: Case Study 2 model making and model use in proposal presentation

The following observations were made from work submitted for the model-building exercise, as shown in Figure 8 ((a) to (g)):

- a) This student used a paper collage to express the organic and curvilinear form of a developing design idea. A conceptual model was then photographed, using the photographs as the base for further design iterations through free-hand drawings of sectional and planal building explorations.
- b) This student struggled to use free-hand drawings and, therefore, opted to make a model to probe the building form and another model for interior spaces. Following this, the two models were photographed, and the initial site programme and planning were formulated by overlaying free-hand drawings on the photographs.
- c) Other versions of the sectional and 3D design ideas shown in Figure 8(b) were explored. The student made a larger model, responding to the previous two site-development models. This was done to provide more design details and refine the developing building proposal.
- d) This design project entailed repurposing and making additions to existing high-rise buildings on the project site. The student used reclaimed cardboard and polystyrene, assembled with masking tape. This was a simple and effective time-saving form of expressing an early design response through 'massing' (sizing, shaping, forming, and relating a proposed building to an existing context).
- e) As the design developed (Figure 8(d)), the 'massing' of the building was refined and proposed new additions were indicated in white and existing buildings in brown.
- f) This shows a sample of handmade physical models of resolved design proposals required for this project stage, along with details of specific parts of the students' models. The students were asked to do so at a larger scale with the aim of showing refined designs.
- g) No CAD renderings were allowed for this stage of the project. Students superimposed their design interventions onto photographs that they had taken of the project site. As shown in this sample, this enabled students to quickly test the success or shortcomings of their design proposals on the project site.

Case Study 3

Case Study 3 presents examples of the students' storytelling. In this paper, the term 'storytelling' refers to effectively communicating the design process towards the final building proposal using graphical representations.

The following observations were made when analysing the submitted storytelling projects in Figure 9:

- a) Without an oral presentation, the student used illustrative free-hand drawings to communicate a design approach used to resolve circulation spaces in relation to the various spaces in the building. The perspective drawing shows that the building's entrance and vertical circulation core were related to the façade.
- b) The student's use of greenery in the building can be seen in the section and perspective drawings; here, circulation spaces were also considered. Spatial planning, scale, form, shading, vegetation, and circulation were evidently explored through section and perspective drawings.
- c) The student explored new additions to an existing high-rise building: the programme of the building was explored using section drawings, as was the relationship between reprogrammed existing spaces and new spaces or circulation on various floor levels, and perspective drawings of selected parts of the building.
- d) Here, the student printed images of the existing high-rise buildings and overlaid tracing paper onto the printed images to sketch and superimpose initial design ideas.
- e) This student managed to express the intended spatial atmosphere created by the place-making features of the proposed building. This was done by sketching the proposed landscape design,

vegetation, activities, and people to illustrate how the buildings and spaces are intended to be used.

- f) In this submission, the student used a photograph of a physical model of the existing building to explore the idea of stacking form when massing the proposed building. This was in the inception stage of the design process. The submitted poster was carefully designed to visually narrate the design idea as a method of storytelling.
- g) The student superimposed a CAD 3D view of a design intervention onto a photo of the existing building on the project site. This gives a viewer a sense of how the building is situated within its context, its scaling and proportionality, how it interacts with the street, and the atmosphere created by used building materials.
- h) This student's design proposal used additive and subtractive forms. The student was able to construct a photomontage using images of the existing building and computer-aided images of the proposed building. This mixed-media approach to represent an architectural design was done to highlight repurposed parts of the existing building in contrast to those left untouched. This gave a sense of material use and contrast, as well as the scale and proportions of the building forms.

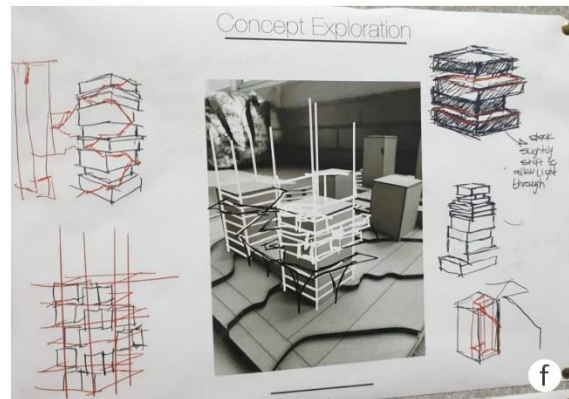
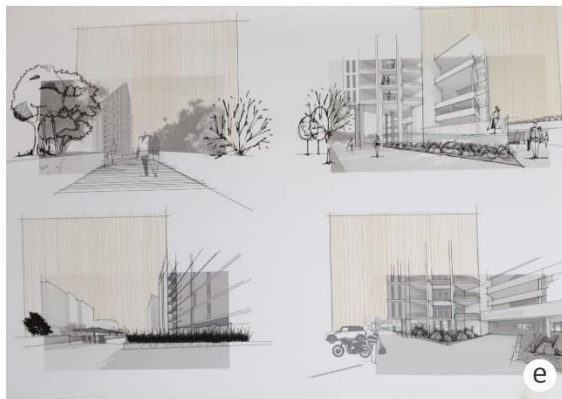
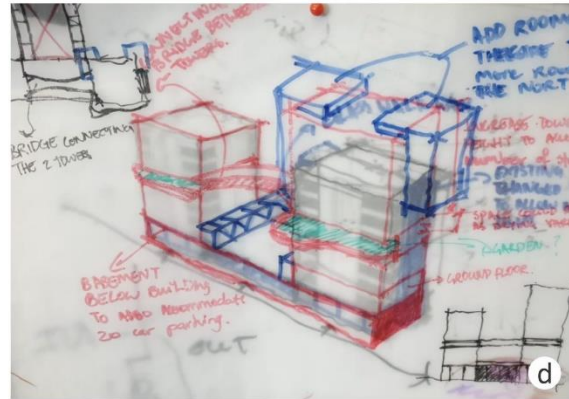
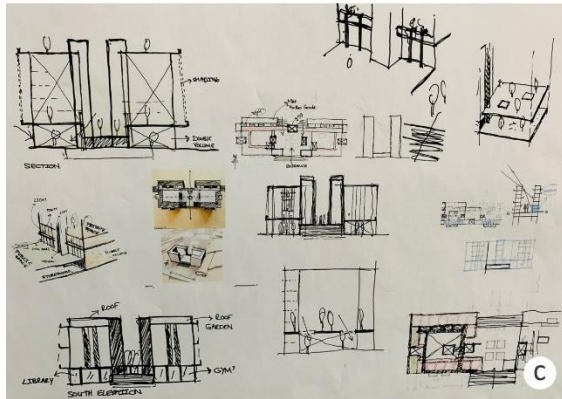
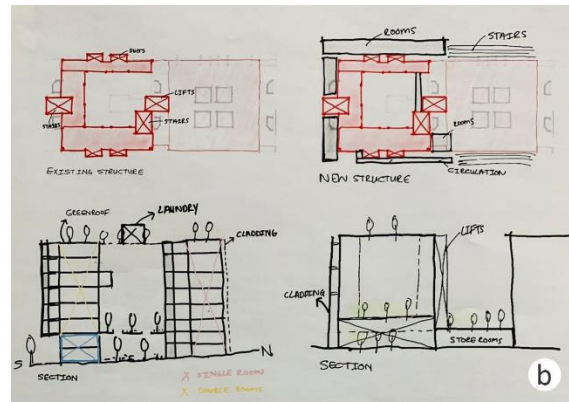
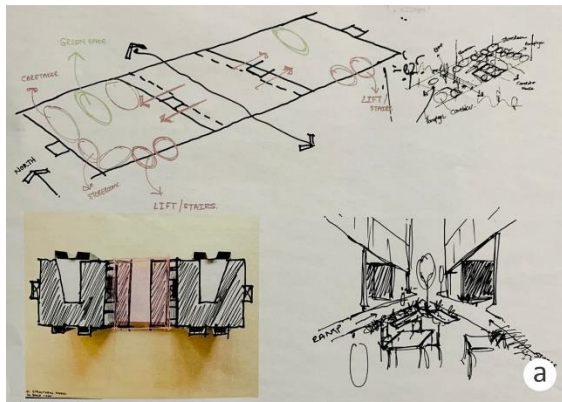


Figure 9: Case Study 3 storytelling and communication of the process towards the final proposal

Summary of findings

The students' outputs provide the data analysed to present the findings of this paper. The findings as per Case Study 1 (conceptual sketching), Case Study 2 (model building), and Case Study 3 (storytelling), indicate a noteworthy improvement in the design process of the students. As a response to various design generators and variables, the architectural process is a nuanced journey with many feedback loops and developmental stages facilitated through multiple design iterations. The case studies affirm that a student's use of process tools such as conceptual sketching, model making, and storytelling to communicate and receive feedback for design activities resulted in a better final architectural proposal.

Comparison of artisanship of conceptual sketching, model building, and storytelling to the exclusive use of computers

CAD can be a highly efficient tool for productivity but has limitations in the architectural design process. With CAD, many drawings may be produced. However, the design quality of the work may be poor due to a lack of eye-hand coordination iterations, poor design development, and ineffective communication of certain aspects of the design process.

Free-hand drawing is often a more efficient technique that can be used for expressing design poetics and capturing the atmospheric qualities of 'place' as opposed to photographs or CAD images, especially when documenting a site. Hand-eye coordination also uncovers aspects that technology-assisted techniques may overlook as each drawn line begins to relate to the next.

Recommendations

The authors of this paper recommend the inclined use of computers throughout the architectural design process. Firstly, computers assist in information gathering and tasks that save time. Secondly, they can accurately produce 2D and 3D CAD design drawings once the concept is developed to a saturation point. The artisanship of conceptual sketching, model building, and storytelling applied during the iterative process of project development should also be used after the design is finalised, in the detailing and documentation work stage, which relies heavily on the use of CAD.

As shown in Figure 10 below for clarification, the authors do not recommend eliminating CAD and other technology tools in the building design and development process. Students use their smartphones to take site photographs, access information online (Google Earth or Google Maps), or listen to music while they sketch. Microsoft programmes such as PowerPoint can swiftly resize a photo or sketch or superimpose one medium over the other. A smartphone can be used to produce a fly-through or flyover video of a physical model during the early conceptual development stages.

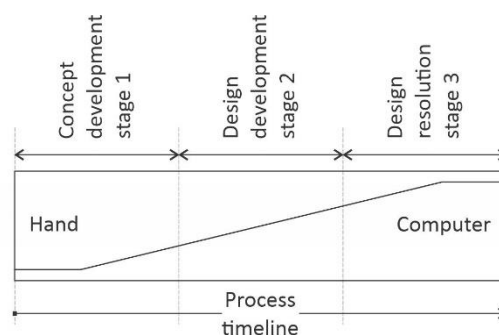


Figure 10: A balanced approach between the computer and the hand during the process timeline of the design studio project

Conclusion

This paper presents an outline of design processes followed by the architecture students and a critical appraisal of what worked more effectively or less effectively. The findings are significant, as the research documented and presented becomes a benchmark for further development of undergraduate design courses for architectural learning sites. Therefore, the paper may contribute to similar existing research by increasing understanding and advancing studio-based teaching methods.

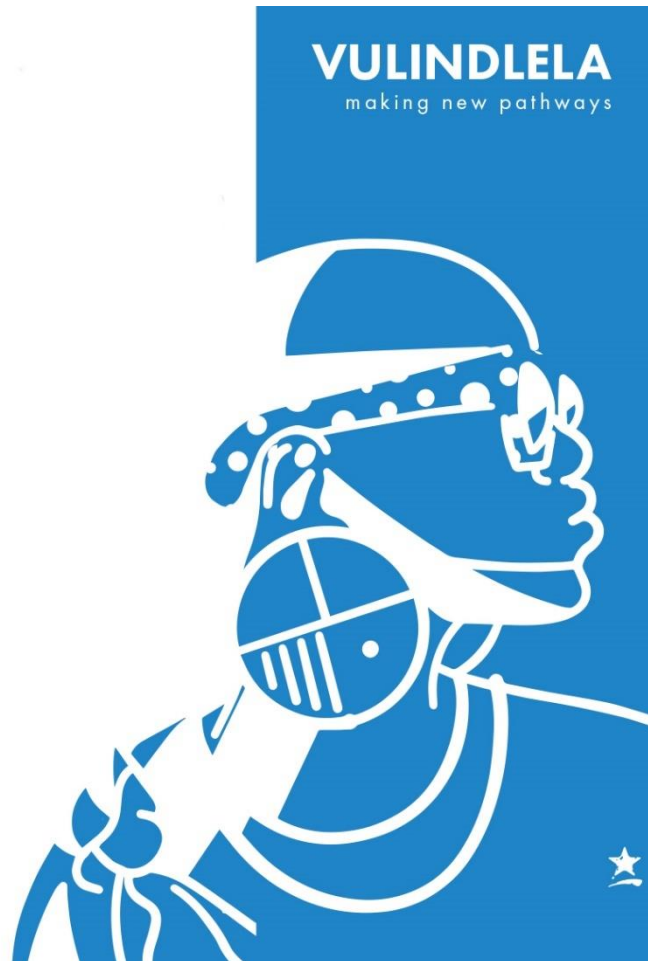
The study also raises pedagogical questions that require further research. For example, a method of measuring the effectiveness of the presented teaching technique requires further research. This future research may comprise establishing key qualitative indicators for judging the success or failure of student design outputs for validating the presented artisanship skills.

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SESSION 8: Making





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

The integration of critical thinking and digital manufacturing in interior design product development

Chiara Croci, University of Johannesburg

Abstract

In recent years, digital fabrication has become an increasingly popular tool in the design field. By integrating digital manufacturing techniques into the design process, designers can produce more innovative and sustainable products while minimising material waste. In this paper, we present a model of approach that incorporates digital fabrication into the prototyping of interior design products using Origami-based techniques. Origami, the antique art of paper folding, has long been admired for its beauty and precision. One of the main benefits of Origami-based techniques is that they provide a way to create complex forms using only simple folds, transforming a bi-dimensional surface into a 3D object. This makes them particularly useful for projecting design objects, such as room dividers, which must be functional and visually appealing. The study involved a group of students who were allowed to study digital fabrication techniques and apply them to the singularity of their product through design thinking and reverse engineering. The study is a pilot for a master's thesis, focusing on the integration of folding in digital fabrication, therefore this project allows the preliminary collection of data that can be used to implement the outcome of the thesis.

By merging activities such as folding, digital fabrication, and prototyping, students could focus on art and design, problem-solving, and critical thinking. By combining wood, paper, silicone, and 3D printing filament, the students were able to create room dividers that were both functional and visually striking. The study emphasised the importance of integrating critical thinking and digital manufacturing throughout the design process and in doing so, allowed the participants to identify potential problems and come up with innovative solutions. The students could quickly and efficiently produce prototypes using digital manufacturing techniques, allowing them to test their designs and make necessary adjustments.

The paper provides a framework for integrating critical thinking and digital manufacturing in interior design product development, from ideation to prototyping. It provides examples of how these approaches can be used at each stage to produce more innovative and sustainable products. The study also highlights the versatility of Origami-based techniques, particularly in creating double-purpose room dividers adaptable to the space's visual needs. The folds can also be used as an integral feature of the product, providing stability and structural needs. Origami-based techniques were revealed to be a perfect way of creating a double-purpose room divider, which is also adaptable to the visual needs of the space.

Keywords: 4IR, computational origami, critical thinking, digital manufacturing, interior design.

Introduction



Figure 1, Author (Photographer), final outcomes examples, 2022

Origami, from the Japanese “the art of folding paper” (Richman-Abdou 2022), in the last 20 years has been gaining ground in fields such as architecture, industrial, interior, and fashion design, among many others (Morrison 2019). Not only has the antique art of folding improved those disciplines but it has also been used to learn mathematics and physics fundamentals and apply them to different scales and innovative solutions. One of the many examples is the astronomist Koryo Miura and his homonymous folding pattern, thanks to which there has been a consistent increase in origami for outer space and shuttles (‘Folding Physics: The Mathematics of Origami’ 2017). Origami in design can be seen as a tool to satisfy needs such as flat packing, material savings, manufacturing process, structural stability, rigidity, and last but not least, aesthetic requirements. The 3D origami pattern, together with the folding crease of textile and paper, creates games of shadows and light, given by mountain and valley pleats, which improve the exterior of the outcome alongside the overall aspect. Besides these features, origami helps the design meet the requirements of the fabrication process that have become fundamental in the present day: energy and material saving, sustainability of each component including fasteners, glues, resins, and budget limitations. As with every other discipline, folding techniques and digital fabrication can only be used in their entirety if well understood, This is why introducing such topics in third years can be a game changer for the way students perceive ideation and prototyping of models. A big issue in the production of outcomes for learners is the fabrication itself. Usually in this phase, many doubts are raised about materials, cutting, and assembly, driving students to choose easier designs that they feel more comfortable producing. Origami and digital fabrication open a whole new chapter for university making, consistently increasing the number of prototypes, manufacturing process, and therefore size and quality of the outcomes (Figure 1).

Context

As expressed in the previous paragraph, origami can be a fundamental tool if integrated into the design process, but to understand it and benefit from it in a teaching and learning context, we go back to one of the most influential institutions of art and design history: the Bauhaus. Josef Albers, a famous designer and artist, lecturer at the Bauhaus of Weimar successfully introduced folding techniques in

one of his courses in Weimar. The experiment usually started by providing a brief, such as producing an object for interiors using only the materials given and simply leaving the room to give the students space for ideation. A clear example he quotes in his book refers to one of his students, who merely folded the paper through an easy pleat, creating a sort of self-standing room divider (Albers 1935). This example is rather fundamental for the understanding of the whole paper, where mountain and valley folds were used to give a bidimensional sheet with 3D properties, including stability, structure, and not least form. The brilliance is that the student did not cut, glue, or tape the sheet, he only used the characteristics of the material, adapting it to the purpose. Albers was not the only one who associated the concept of folding with teaching and design. In fact, Paul Jackson (professional artist), based on Albers' foundations, defines folding as a primary design tool, a key factor in design education and practice (Jackson 2011, p. 09). Jackson has been one of the first to identify a difference between teaching students how to make origami and teaching them how to fold (Jackson 2011). Folding can be used with many materials and for infinite design applications (Jackson 2011), breaking down obstacles related to the complexity of design and production. Albers and Jackson have been pioneers of folding techniques applied to design teaching and learning, merging arts, digital modelling, and fabrication to reach the most unexpected outcomes (Figure 2). Thinking about the well-known Bauhaus manifesto "form follows function" ('When Form Follows Function' 2019) it assumes an even wider meaning if paired with Albers' (1935) concept "from sheet to form". The whole statement can be seen as a sheet creates a form (through folds) and form satisfies the needs and aims of a defined function, giving us access to a completely new guideline: flat surfaces, if folded and given structure, create form and therefore answer the needs of different products and concepts.

Aim and objectives

This project aims to integrate folding assets in the design of a room divider for the interior, relating design manufacturing to critical thinking and learning. The objectives are to raise the prototyping accuracy and scale, help the students to use origami-based properties (structure, folding, dimensionality of models) as an advantage, and integrate them into the design ideation. Additionally, part of the objectives is to teach the students how digital manufacturing is strictly related to 3D modelling and a thorough understanding of machine properties.

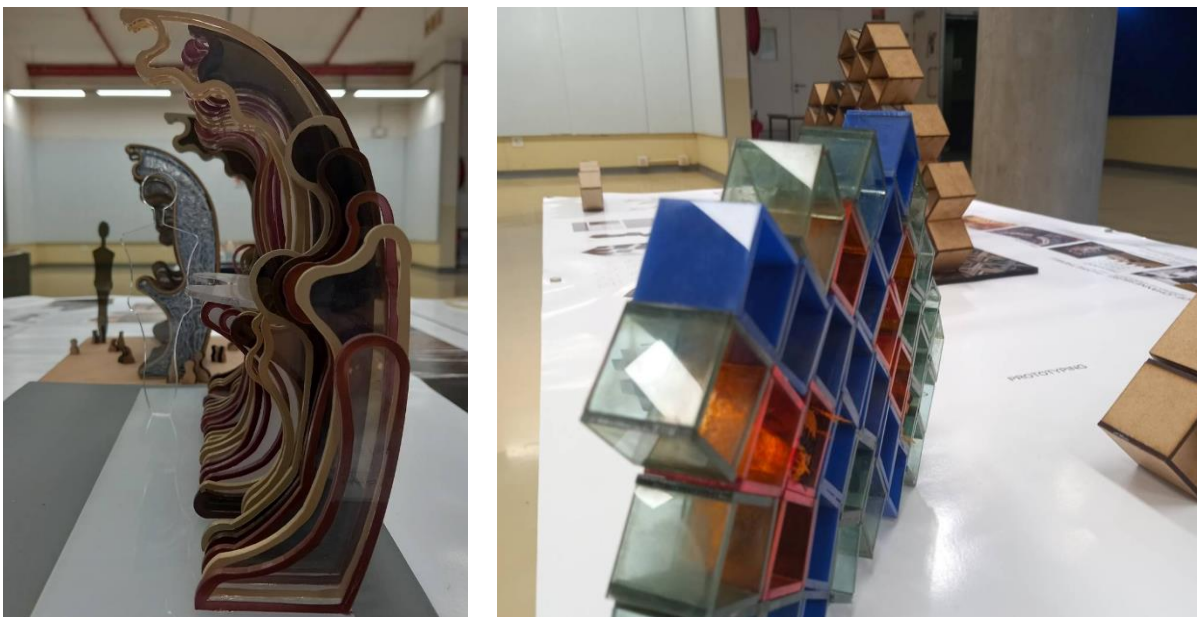


Figure 2, Author (Photographer), examples of the outcomes reached 2022

Methodology

We decided to approach this project from a learning-through-making perspective. As the students receive many frontal classes throughout the year, we developed this module prioritising design ideation, prototyping, and making. The methodology chosen could be paired with Action Design Research. ADR focuses on four fundamental steps: problem formulation, prototyping, observation, and reflection (Sein et al. 2011), with an integrated aim of supporting the development of the design (Cronholm & Göbel 2022, p. 21). Once the problem has been identified, the participants can start with prototyping, followed by observation and reflection for further implementation. This cycle repeats until the best possible outcome is reached (Sein et al. 2011). The ADR methodology is based on practice, therefore to implement the findings of the experimentations, we integrated additional feedback and considerations within the participant's group, through brainstorming sessions and sharing of knowledge. For the duration of the two months, the project took place in the laboratory, allowing students to be inspired by the surroundings and join the conversation with their peers between production phases.

As mentioned above, ADR is a practice-led discipline that works consistently with the research-through-design (RtD) methodology. As Faste and Faste (2012) evaluate in fact, RtD is a Design practice that creates research, where the findings coincide with the thinking process and physical outcomes of the design (Faste & Faste 2012, p. 6). ADR and RtD work together in the generation of knowledge, where an appropriate critical thinking approach, integrated by the peer feedback sessions, guides the discovery of findings and their application in the next iteration. This project has the additional function of pilot for a master's thesis, identifying possible implementation in design thinking and production. As a starting point, the research, therefore, focuses on the formulation of problems and tackles those through folding and digital fabrication, allowing ADR and RtD to work together in the creation of findings and feedback before the next production cycle starts.

Development

Starting from the idea of a flat surface that, when folded, helps the design to meet requirements, we developed an origami-based project through digital fabrication for interiors. The students were required to create a room divider for a chosen context in Johannesburg, whether it was a shop, festival space, or car showroom. The divider is supposed to have two main purposes: separating space and an additional feature at their discretion, some choose to include benches and different sitting solutions, and others add lights, hangers, or shelves. As mentioned above, the most important part is that any requirements would be met by taking advantage of origami characteristics and using folding techniques as a strength in the design choices. Lingering on the brief of the module introduces the document on the other fundamental part of the research, alongside origami: digital fabrication. Thanks to this feature, students were able to pursue outstanding results in the two-month timeframe of the project. In fact, through the open access at the Fab Lab and experts' supervision, students had full entry into every digital and analogue production process, such as 3D printers, laser cutters, and Computerised Numerical Controls (CNCs). Additionally, the manufacturing has been integrated with base wood machinery, carpentry techniques, resins, and silicon modelling (Figure 3). Digital fabrication is, therefore, a key aspect of the project, which allows students to produce many prototypes of high resolution to then have a working finalised outcome, otherwise complicated, imprecise, and time-consuming. While the students already had ideated concepts of the room divider's final design, the implementation of those could only be pursued with access to digital fabrication techniques. Students were required to create digital files, adapted to be fabricated on an A3 size, to then study the prototypes, create conversations, and develop considerations. This project

has a big focus on initialising cues and discussions, projecting digital manufacturing into critical thinking, going back and forward until reaching the most implemented finalised outcome (ADR). The reason why digital fabrication enables the production of many objects is due to the computational work of machines, where, thanks to the correct preparation of digital files, the production is fast and precise and does not require the handwork and timeframe that could be needed in analogic manufacture.



Figure 3: Author (Photographer), resins and silicon modelling prototypes, 2022

As mentioned before, origami played a fundamental part in the learning, aside from being the tool used to design the concepts, it needed to be the main feature of production, making folding techniques the centre of ideation and implementation. The students were required to use the folding pattern as a way of answering the brief and incorporating the required features of the divider. A previous study explains how much origami is enabling the creation of new coding processes based on math and physics, repeating the same mechanism (in this case folding) multiple times and therefore implementing the way our brain learns and memorises (Siu 2022). There is something almost meditative about repeating similar actions following guidelines to reach the desired outcome, which is extremely important to implement the thinking activity and passive listening. This very same concept has laid the foundation of the learning process in this project, where the students were not asked to attend frontal classes, but rather learning through making. The strong aspect of the layout is the link between computational origami and digital fabrication, the ability to reverse paper-folding techniques into computational 3D modelling, using folds not as a restriction, but as strength. Computational origami, mentioned above, is a term indicating the projection of folding paper into computer programmes, such as Rhino and Grasshopper, enabling a thorough study of shape and material strength. Additionally, the ability to build origami in 3D modelling programmes creates the possibility of producing complicated shapes and studying how they react through folding patterns. This concept helps the students to realise that with the right tools, there is no limit to what can be done at any level of their educational programme. The key aspect of the project is therefore to create room dividers using origami techniques to implement and innovate a rather simple design. As mentioned previously in fact, origami must not be seen only as an artistic aspect of the ideation but needs to be understood and used to create structures that are strong, compact, and adaptable to various needs. Combining teaching and learning with manufacturing and digital fabrication requires the involvement of experts and an arrangement between different fields, such as interior and

industrial design. Not only this relation is fundamental for the development of the project but gives students the possibility of approaching prototyping and small-scale production from an industrial design perspective, acquiring knowledge about file preparation, software use, exportation, and machine work. In addition, the combination of folding techniques and ideation made it possible for students to reach final results that were outstanding, precise, and beautiful (Figure 4).

Findings

As with many of the projects, this experiment gave the chance to improve collaboration and knowledge from a teaching perspective as well. One of the main problems encountered was how to facilitate the students in the preparation of files to avoid having any problems during production, wasting materials and time. While simple exportation, whether for 3D printing (STL files), laser cutting (dxf files), or CNCing (dwg files), could seem to be correct and therefore working in production, there are tools to predict possible errors, which many times come from the exportation itself. Using different programmes, usually due to the metric systems of exportation, is part of the problem, where the student must be careful of scale, mesh-rebuilding errors, and curves overlapping, which could end up in fabrication as unrecognised 3D files, double cutting and engraving (wasting time and resources) or extremely out of scale files. All of these problems are difficult to keep in mind for students, whose focus is usually on the usability and exterior look of the product, leaving manufacturing issues behind. This is the reason why at the very beginning of the project we provided a guided tour of the facilities, including Fab Lab, industrial design workshop, and a thorough explanation of various origami and robotics-related objects, providing examples for inspiration and understanding. From the manufacturing point of view, therefore, the main challenge was to accurately explain the relation between the final produced outcome and computational modelling because it is only through a careful understanding of machines and digital fabrication that it is possible to use those skills in favour of ideation and implementation. During this time of training and trials, it was fundamental, from the expert point of view, that the students attended the preparation and production, assisting in material choosing, machine preparation, and post-production cleaning (3D printed extraction of support for example). Choosing to have the students experience firsthand the most common issues of digital fabrication, including but not limited to the time wasted on fixing files, was fundamental for understanding how digital manufacturing can be efficient only if carefully followed step by step. The students found this last issue particularly frustrating as, if the object is not correctly prepared for manufacturing, the time optimised through digital fabrication gets lost in the adjusting of the file. Nevertheless, from a teaching perspective, having the participants find and correct their own mistakes, alongside digital fabrication experts, helped them to create better files and therefore final products.

Once the students were able to correctly approach the creation and exportation of 3D models, they could start properly utilising digital manufacturing and critical thinking, choosing different strategies and angles. A particular case is the evidence of students wanting to 3D print instead of laser cut, as in the first scenario, the project is done and ready, while in the second there usually is an assembly post-processing of the product. Throughout the learning of origami and folding techniques, almost every participant decided to ultimate the outcome through CNC or laser cutter, demonstrating a proper understanding of the concept “from sheet to form”, where the final 3D product is built from a bi-dimensional sheet of cardboard, MDF or paper. This was the ultimate goal from a digital fabrication and computational origami perspective: the use of ancient techniques to study form, structure, flat packaging, and material saving. The learning that the participants were able to absorb during the two

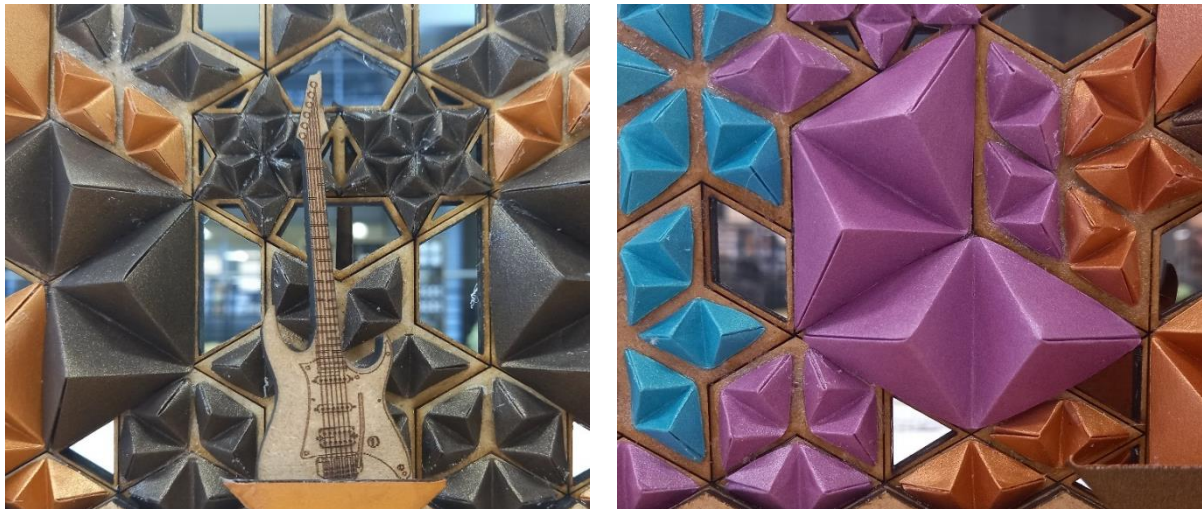


Figure 4: Author (Photographer), outstanding examples of final outcomes, 2022

months of the project has been extremely broad, including the changing of perspective seen in the tackling of ideation and implementation.

Conclusion

Origami and digital fabrication can radically improve the quality of projects, from both a learning and making point of view. Thanks to continuous folding and a thorough study of design requirements, the students were able to optimise folding techniques for the ideation and implementation of prototypes. As often happens in university projects, as good as the concept can be, its realisation is either left behind or minimised due to a lack of resources and time. In this project, the participants were able to manufacture and give life to their ideas on an A3 scale, which is a fundamental aspect of learning through making, alongside the satisfaction of visually appealing products. Origami, computation, and digital fabrication combined were able to answer project needs, design requirements, action research, and technical knowledge, creating a unique learning experience. Students consistently augmented their skills during the module, together with the ability to use critical thinking, providing excellent feedback to one another. This project exceeded lecturers’ and experts’ expectations, raising possible future applications in different design fields. From the expert point of view, the students allowed us to open new possibilities for learning and making, using origami as a resourceful art and irreplaceable design tool, which we can only keep improving from this point on.

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This was a digital fabrication project within the Department of Interior Design at the UJ Faculty of Art Design and Architecture. It was undertaken with the third-year Interior Design Practice Module, under the lectureship of Sadiyah Geyer, Kimberley Kloes and Eugene Hon. My role within the project was of expert digital fabricator, with the finalisation of the designs and suiting them to be manufactured in the FADA FabLab with the various available Digital Fabrication technologies. The names of the specific students are not included in the document in alignment with conference feedback requested sensitivity around the POPIA Act.

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Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Visual mapping and meaning-creation: Making research visual for design-based thinkers

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Abstract

In exploring the significance of metropolitan open space systems in building meaningful city brands, the researcher utilised Visual Narrative Inquiry to explore the opinions, perceptions and lived experiences of Durban residents and its' metropolitan open space system. As a design-based practitioner, the researcher grappled with finding suitable 'meaning-making' methodologies that would answer to both the academic rigour required of a master's dissertation as well as their own needs to visually make sense of the ideas, theories, models, and metrics. This autoethnographic study is a critical reflection on the research and meaning-making process of a design-based thinker, utilising visual mapping. Visual mapping helped the researcher to gain a deeper understanding of their problem and ultimately answer the research questions, embracing a meaning-making process that appeared to be logical, adopting and trialling various methods. Throughout the master's process, the researcher utilised visual methodologies to make sense of their thinking, analysis and planning and utilised the same to share their thinking with their supervisor and mentors. Through the visual mapping process, the researcher was able to make sense of and articulate the connection between the literature, methodology, research, thematic analysis, and findings and through the visual mapping process, was able to further identify existing, potential, and implied connections exploring the topic at a deeper level. Through visual mapping, the researcher was able to create an integrated approach to visualising and analysing the scholarly research. The contribution of this study is to recognise the significance of, and to encourage the use of familiar tools and methods, such as visual mapping for design-based thinkers, practitioners, researchers, and their supervisors in postgraduate research studies. Design-based thinkers often require visuals to explain their thought process while utilising visuals to work through their thinking. This autoethnographic study critically reflects on the research and creative meaning-making process as a design-based thinker and the methodologies explored, while reviewing the various artefacts from the dissertation. The paper concludes by sharing the key insights and significance of supervising design-based thinkers, arguing that familiar tools and methods and a tactile process such as visual mapping enable a deeper and more meaningful sense-making and meaning creation process for design-based practitioners.

Keywords: Autoethnography, design-based thinkers, making research visual, visual methodology, visual research methodologies, visual mapping.

Introduction

This paper is based on the narrative nature of an autoethnography and guidelines provided by Denzin (2014). The story creates a form of tension with events unfolding, an epiphany and reveal, and ultimately the conclusive point that gives meaning to the narrative, providing insight worth sharing within a community of practice. Adams and Herrmann (2020, p. 2) explain that autoethnographic projects use selfhood, subjectivity, and personal experience (“auto”) to describe, interpret, and represent (“graphy”) beliefs, practices, and identities of a group or culture (“ethno”). This paper presents the narrative of how the researcher, as a design-based thinker (the auto), critically reflected on his own research journey, situated within the context of supervisors facilitating design-based students and their sense-making and meaning-making process. The researcher explored the use of familiar tools and visual mapping that formed part of the research process, with observations and reflections shared between his supervisor and postgraduate students (the ethno). The artefacts and actions captured and reflected on through journaling formed part of the data collection and analysis, with the findings presented here as a reflexive narrative (the graphy).

This narrative weaves the theoretical frameworks into the experiences shared (ed. Boylorn & Orbe 2016, p. 20), while also “formulating a theory or general explanation about the researcher’s experience”, with this “theory” serving as an explanation of “how and why something happened” (Pace 2012, p. 7).

Adams and Herrmann (2020, p. 2) elaborate that the researcher’s experience is “used intentionally to illuminate and interrogate” and that the essence of an autoethnographic study “assumes that personal experience is infused with social norms and expectations” and that such a study engages in “rigorous self-reflection – often referred to as “reflexivity”. This paper invites fellow researchers and supervisors to reflect on their own experience and social norms and to consider the possibilities, especially within a design-based community of practice. As Ellis and Bocher (2016, p. 10) state that:

[Autoethnographic] stories welcome readers into these experiences, encourage us to compare and interrogate our own perceptions, and reveal the challenges and opportunities we face in negotiating our worldviews with the understandings of others in our communities.

Although this paper is co-authored, the researcher is firmly positioned within the narrative as the narrator and main character (Anderson & Glass-Coffin 2016, pp. 57-83; Denzin 2014, p. 4). Cohen et al. (2018, p. 297) echo this approach by explaining that: “an autoethnography places the self – the researcher – at the centre of research about himself/herself in a social context”. For this paper, the researcher is positioned in the first person.

The photograph: A 'novel' moment

This paper focuses on my experience with visual mapping for my master’s study and subsequent experience in teaching postgraduate design-based students at a brand-focused private higher education institution. Placing oneself in a study involves grappling with personal emotions, beliefs, actions, biases, and failures, in relation to others (Adams et al. 2015, pp. 8-11; Ellis 2004) while it also provides an opportunity to share insights, experiences, and acquire knowledge on a particular topic. Ellis (2004) explains that autoethnography is a symbiotic and relational process of looking both outside in and inside out. Ellis (2004) elaborates on this by stating that the researcher’s personal experience and introspection is a process of looking more deeply into the interaction or relation with others, sharing insights because of this engagement.

A particular moment was the starting point of this inquiry; where I became curious about why I used (and felt the need to use) visual mapping, experiencing an inner tension when faced with the conventional methods and tools used as part of the research process. Working with students as a supervisor, I noticed similar frustrations and limitations.

In preparation for a colloquium in July 2019, I wondered why I had not opted for a conventional presentation instead of carrying a large rolled-up sheet. I nervously observed the other students using PowerPoint presentations. When it was my turn, I retrieved my large roll of paper, walked to the front and as I began speaking, I unfurled my visual map – brown card larger than A0. The map depicted my progress, questions, objectives, and how I planned to address them. It consisted of drawings, quotes, literature excerpts, photos, and connections. Creating the map was a process that involved thinking, exploring connections, and analysing research – it was an attempt to visually express my academic thinking. As I presented, the head of academics suddenly stood up, and with excitement took a photo of me. I noticed the entire audience leaning in with interest.



Figure 1: Presenting unconventionally (Simpson 2022)

This was an incredible moment for me, as I realised how significant and unique my approach had been in that context. Although it felt natural to present progress like this – it was applauded as novel. I was overcome with a quiet confidence from the experience.

Much later I would read Kelley and Kelley (2015, p. 229), inspiring creative confidence by suggesting that “when others bring a stack of PowerPoint slides, try using a single image and telling a compelling story”. Margulies (2002) and Root-Bernstein et al. (2022) argue that understanding requires both our personal intuition and the ability to symbolically demonstrate knowledge.

This moment, left me with a sense of curiosity; what exactly made that a novel and significant moment? I realised that there were two critical factors why I opted to present using my visual map; my background as an architectural student and my supervisor’s strong influence through her coaching style.

The architecture student: A design-based thinker

Although a qualified architect, I teach design at a brand-focused institution. On my first day at university, we had to produce a concept design and present it on a large sheet of paper. Working on such a large scale was new to me and left me excited. Working through the night, I proudly displayed my work only to have a lecturer scribble all over it with a thick red marker. Never again would I mistake

the idea of a concept design for a final one. I learnt to have fun in the creation, to push boundaries, explore ideas and to play during the process. Skaggs and Twede (2023) echo that incorporating play into work stimulates creativity, which in turn helps develop the ability to discover, explore, experiment, and learn.

Reflecting now – I realise how influential these moments were on my master’s journey. As a student, I had to communicate ideas and thinking visually, through drawing and discussion, on large sheets of paper. We learnt by doing, showing, discussing, breaking down and redoing. I still have scars from cutting materials and recall the feel of my drawing pens, the smell of the glue, the sense of pride and achievement after each step. These memories somewhat mirror my master’s process. I even used the same type of paper and markers almost thirty years later.

Root-Bernstein et al. (2022, p. 3) assert that thinking includes engagement with all of the senses, “sights, sounds, smells, and so forth, abstracting out essential information, recognising and forming patterns, empathising with both animate beings and inanimate objects, as well as body thinking with muscle tensions and emotions”.

As a design-based practitioner and educator, I grappled with finding suitable ‘meaning-making’ methodologies that would answer to both the academic rigour required as well as my need to visually make sense of the ideas, theories, models, and metrics. As an educator, I resonated with Gormley and McDermott (2015), arguing that visuals help communicate thinking, understanding, interpretation and comprehension of ideas, yet felt conflicted in the conventional product of a dissertation relying on text-based evidence – which, as a supervisor, I was now supposed to be encouraging my honours students to do. Nuzzaci (2019) argues that despite the prevailing visual nature of contemporary society, education continues to prioritise written communication over other forms of expression. Textual evidence in academics generally does not demonstrate a connection to personal responses and connections to the researcher (Gormley & McDermott 2015).

I realised that the first problem I encountered was linking my area of interest, spaces, and places, to brand. Although I extensively wrote and researched, I could not make those connections work.

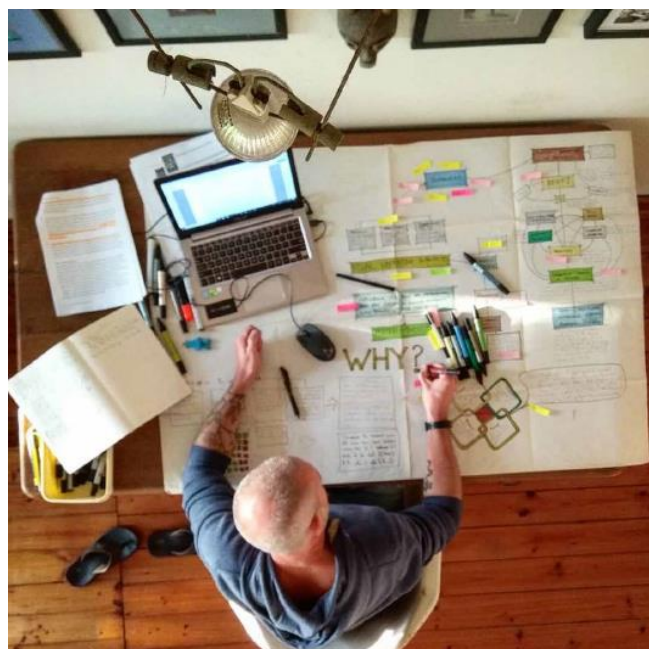


Figure 2: Big thinking needs space (Simpson 2022)

Although my process is not unique, my study was described as novel, connecting my undergraduate architecture degree to the world of brand building in which I now situate myself.

The supervisor with more questions than answers: Noticing the need

At the start of my master's, my supervisor asked a pivotal question: "So why don't you bring your love for architecture into the world of brand building?". I blushed; she had triggered something. An emotive and visceral reaction that sparked my interest. I began creating mind maps of my thinking and interests from that time. Journal entries from our supervision sessions took the form of questions. 'Why does this matter?', 'What does this tell you?', 'What makes you feel this way?'. She asked questions in a way that helped me to (re)frame my thinking, providing direction without direct answers.

My supervisor observed my way of working and noticed that I needed to express my thinking on paper. She recognised that working in a linear fashion was not going to work for me, and to deliver effectively I would need to make sense of my thinking visually. Santiago (2011, p. 130) explains that a student's "awareness of their own thinking process" is paramount and that visual mapping engages both left and right brain abilities and helps encourage critical thinking by allowing the student to "explore, analyse, synthesise, and share ideas", which ties to the constructivist learning approach where interactions allow for opportunities that give learners the ability to build knowledge through reflective interpretation of activities (Cholewinski 2009). Nuzzaci (2019) asserts that the core of visual thinking lies at the junction of creativity and critical thinking. Creativity encompasses the exploration of patterns, shapes, textures, and colours through visual methods, while critical thinking involves analysing clues, considering alternatives, and exploring diverse possibilities.

Through mapping my thoughts, I was able to connect ideas and think more holistically. Ligita et al. (2022) argue that mapping tools help qualitative researchers to visualise and represent complex thinking and assist in finding insights through the analysis phase by organising and constructing knowledge from the data. "Critical thinking and visual thinking combine in linking materials, previously learned personal experiences, and new experiences" (Nuzzaci 2019, p. 244), while Lupton (2014) argues that design is a process where instinct and intent blend.

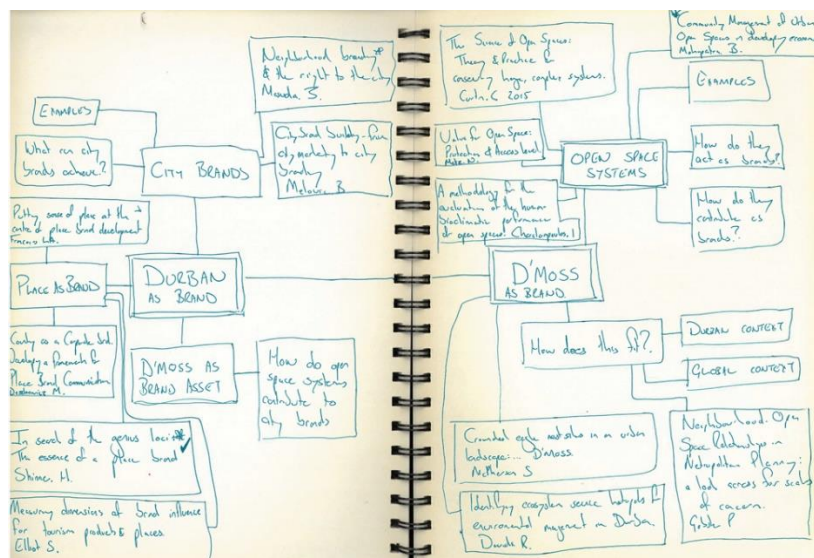


Figure 3: First 'map' from my master's study (Simpson 2022)

Lupton (2014, p. 22) describes mapping as allowing “designers to quickly explore the scope of a given problem, topic, or subject area”, while Divya and Smitha (2020, p. 834) describe mapping as a tool to aid in comprehension, which enables one to “visualise the structure of knowledge”. For this paper, visual mapping is considered to be a general term covering concept maps, mind maps, idea maps and other tactile visual sense-making tools; using traditional creative tools. My initial maps were created in my journal to explore topics for research while reading the literature. As I progressed, the maps became more analytical and complex. Together with reflexive journals, mapping became my most valued research tool. They increased in scale, moving out of the journals and onto large sheets. Butler-Kisber and Poldma (2010) argue that mapping is a useful tool to interpret, understand, analyse, and inform experiential qualitative research when combined with reflexive practice, which helps express the researcher’s thinking as it evolves.

Reflecting on this, I questioned whether I would have had the same approach with a different supervisor. She encouraged me to think in a way that came naturally to me and through well-articulated questions, to seek my own problems and solutions. She carefully observed and encouraged the use of visual mapping as a familiar tool to express my thinking. Although she probably did not say so in as many words, she encouraged me to use my visual map instead of a PowerPoint presentation, when I doubted myself, she challenged me by asking: “what makes you believe that you can’t?”

A view from the top: Making connections

My visual narrative inquiry explored residents’ lived experiences and emotional connections. The process of analysing the transcripts and trying to sort themes and narratives into tables, spreadsheets and the like frustrated me. Emotional connections did not belong in little square boxes. After several failed attempts working with the data digitally, my supervisor noticed that I was stuck; “why not map it?”. I printed the transcripts, cut them up, along with reflexive journal entries and field data, and mapped them out on large-scale paper. Through trial and error, I managed to connect my data with my literature findings.

The process felt intuitive and tactile, resonating deeply with me. The flexibility of it helped immensely. Viewing the map from a distance provided a fresh perspective. I vividly remember a moment when I stood up and noticed one sheet was upside-down, discovering an overlooked connection. As I continued to play around with repositioning, I found additional similarities. My preconceived notion that research could not be enjoyable changed – I was playing with pieces of data and having fun – it did not feel like work. Although the final output of the research was a written dissertation, the process of thinking, the meaning creation and understanding came through the visual mapping in a tactile manner.



Figure 4: Seeking connections (Simpson 2022)

Visual mapping gives researchers an opportunity, argue Ligita et al. (2022), to interact with data in a creative and meaningful manner to help organise and make sense of what they have found. I found the process of reading, writing, analysis, and research done on one device limiting. Instead, I used free writing, highlighting sections on printed articles, and drawing to process and organise my thinking. In order to aid with academic writing, I would cut the articles up and paste relevant pieces together to construct arguments visually, before writing them. This technique – although effective in gaining understanding and constructing knowledge, had its pitfalls; I frequently forgot to include references and had to backtrack.

Visual maps are not generally used as final outputs but are used in the process, argue Ligita et al. (2022), while Avdagic et al. (2021) and Daley (2004) suggest maps can be used during analysis, interviews, focus groups and in the presentation of results. The maps assisted me in the analysis and writing of the literature review, provided direction in the research design, and used extensively in the data analysis and concurrently to present the research process and findings through more finessed diagrams. I also found it easier to talk about my master's by showing the distilled process map:



Figure 5: Distilled process map (Simpson 2022)

Big paper thinking: A more creative approach

As a master's graduate now able to teach a design-based honours degree, my supervisor and I were assigned students to supervise. In supervision sessions, students were encouraged to map their ideas. From my interactions with the class, I observed that their design process had become more linear and that they were working exclusively on their laptop devices. Leading up to their proposal presentations, as part of a class I encouraged mapping their process. At the end of the lesson, several students left their maps on the table. Although Butler-Kisber and Poldma (2010) argue that mapping often attracts the attention of design researchers, as the process of visualising information is a natural one, the idea did not resonate with them.

Intrigued by this, I decided to explore it further. The aim was to understand whether my experience could relate to fellow design-based thinkers, and how they might benefit from making their research more visual. Qureshi and Vazir (2016) argue that supervisors use their own experiences from their postgraduate studies to inform their supervision style. In keeping with a constructivist approach to teaching and learning, I wanted the students to build on their own understanding of the information

they had already researched, by truly engaging with the material in a different manner, allowing them to dissect, reassemble and reexamine the material.

Students were invited to participate in a visual-mapping focus group that took the form of a workshop. Seven of the ten students invited participated. The students were approximately halfway through their honours programme. They presented their proposals in the weeks before and were exploring research methodologies at the time. Participation was voluntary and informed consent was received before the workshop commenced.

The focus group was structured to observe the participants in action, using mapping activities complemented with discussion. A suitable environment with good lighting, sufficient space, and comfortable surroundings with mapping materials, including a creative toolbox, was provided. Participants were asked to:

1. Intuitively visualise their research process using a simple line drawing on A4 paper
2. Describe their research process using words, including their emotive responses, and the kinds of thinking they applied
3. Display the drawings and collectively discuss through explorative questions, sharing what they noticed
4. Create a visual map of their research on large-scale brown paper (A0) using pre-printed copies of their research proposal and presentation
5. Reflect as individuals on the experience by answering questions such as: what did you notice during the map-making process, what remains unresolved and should still be considered, what did you learn from the process, how might you consider using visual mapping as part of your research process, and how will that serve you?

To aid in their research process, participants were able to keep and continue to use their maps. The individual reflections, maps and mapping process, discussion, together with my own journaling, were utilised as data for analysis.

When presented with a creative toolbox, the students became excited and engaged on a different level. There was an emotional response when they saw the tools set out. A few elements stood out: the use of colours, the large brown paper, and seeing their proposals in printed format. One participant stated, "it felt exciting to be doing something design related and with colours" and another shared "mapping is physical playing, although not 'work', it was more productive".

The students really engaged with the process. What happened for me was happening for them. They were having fun and were able to make previously unseen connections. One participant experienced a significant 'aha' moment when she realised that her research process correlated with her theoretical framework: "I was unintentionally following the same process when creating my research map".

What I have found was that the process, although resonating with the students using familiar creative tools, invited them into a creative process not necessarily familiar to the confines of research; as a participant responded: "I also found myself more engaged and immersed in my study compared to other instances. As instead of working on my study through a laptop, I actually saw it on paper and was able to create and discover".

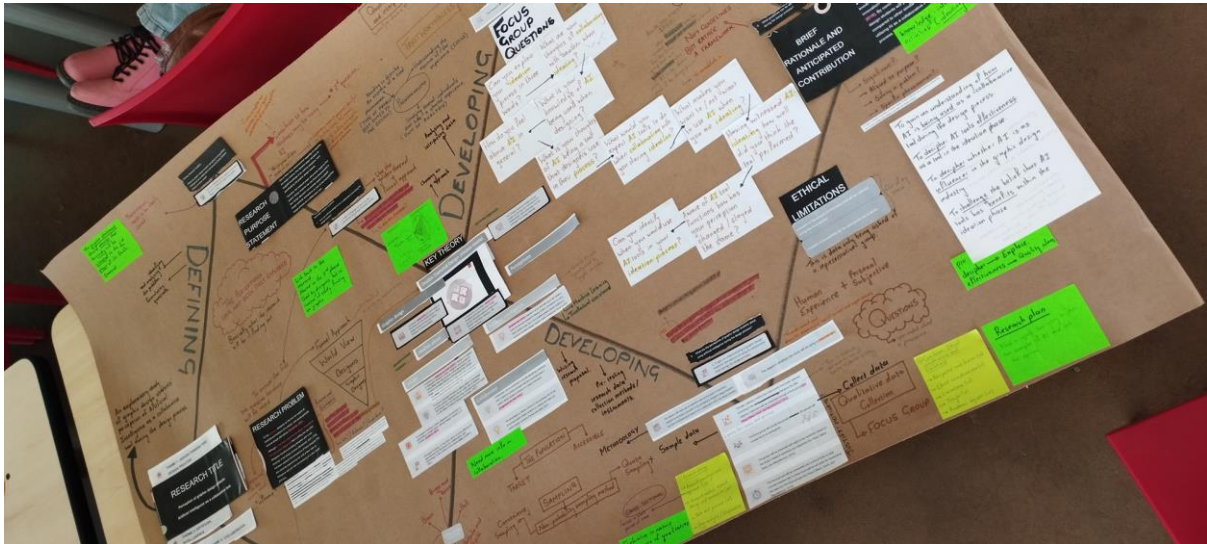


Figure 6: Students working visual map, with additional supervisor notes added (Simpson 2023)

Lupton (2014) stresses the need to sometimes break apart pieces of a project to understand its core before rebuilding it. Echoing this sentiment, students were given the freedom to cut their proposals into pieces and rethink the connections, flow and structure of their work.

Several students discovered connections that they had not seen before, and many commented on how their golden thread became more visible and clear. One participant commented that “with mapping I realised that the different sections of the research hold relevancy to or dependency on each other where I hadn’t seen it before, and this helps reinforce a golden thread” and another becoming aware of “how maps and links were in my research proposal that I didn't notice before”.

Students expressed that doing mapping “felt more like play than work”, because they associate laptops with working, and they realised that “you could be more productive thinking physically and you are more free to think and turn and come up with non-linear thoughts”. One participant observed that “I also realised how doing this process on just my laptop is quite limiting in the sense of creativity, excitement and expansion”. The students pointed out that when talking about their projects, they would usually have their laptop open to talk through points, but that in this case, it felt good to be “thinking and talking it through without my laptop”. Another student observed the significance of the mapping process: “[The] map-making process is beneficial and should be done throughout any project as map making can be applied to anything that involves a process and solution. The actual process of making the map is also beneficial as it takes the person away from a structured and stagnant process of mapping intellectually”.

At the end of the workshop, the students asked, “can we keep it?” and they walked away with their visual maps, eager to use them in their next supervision sessions. Students expressed pride in the visual output created from their own work.

Making research visual: The significance

Going into this research, I believed that visual mapping would be an effective method for design-based thinkers as they are used to working with visuals. I further believed that the creative tools were familiar tools to design-based thinkers. Although the creative tools are familiar, it is not necessarily

the tools used in an academic research context; and especially for digital natives who use digital devices daily.

For many of the students, working on large sheets of paper was a first. When I presented students with the large sheets, using colour and the “permission” to physically dissect their work, they were delighted and excited, especially at the prospect of working by hand. The large sheet presented a sense of being boundless and playful. This encouraged the space for “big picture” thinking and allowed for connections to happen. It encouraged looking for gaps, being curious and to seeking solutions. It encouraged a playful process, for creative and analytical thinking to happen, synchronously.

What I have noticed is that computers have become a potential crutch; a belief that we are not really “working” (as researchers, designers, and students or in general) unless we are performing the required tasks on a device such as a laptop or on screen. The students, as much as I did, felt a sense of delight to think that we were “allowed” to approach the research process in a creative way. The immediate assumption was that research, analysis, thinking, and presentations should be done using a computer. Although the creative tools were familiar, the common route was to use computers instead; focusing on the final product instead of creatively engaging in the process. What would the impact be, if we as supervisors were to carefully notice the need for design-based students to think visually and encourage students to use creative tools?

Conclusion

The authors argue that supervisors, in their capacity to appropriately guide design-based thinkers, should be mindful of their influence in either limiting or encouraging play as part of a critical sense-making process. The significance of supervising design-based practitioners is in the facilitation process of encouraging the use of familiar (creative) tools and methods, creating a tactile “thinking” process such as using visual mapping that enables a deeper and more meaningful sense-making and meaning creation-process. By encouraging the use of visual mapping, a supervisor is able to introduce play into the thinking process.

The output of postgraduate studies generally places emphasis on the delivery of a written dissertation, delivered in a linear fashion, making it easy to forego the creative process, but arguably, research projects require far more planning and playful ideation than many a design project, due to its highly complex sense-making and meaning-making nature. We are not suggesting that every supervisor and student need to bring out an A0 sheet, but rather to notice the need, and support creative freedom during the research process, and to experiment with tools that enable their thinking and make their research visual and tactile.

Our computer screens have become our familiar tool; our “go-to tools” for search, for research, for communication and often for play and design, but operating on a screen can be limiting. If we are to influence the minds of future thought leaders, then we need to encourage our students to think beyond their screens and provide ways and tools that connect design-based thinkers back into creative play, where creative and analytical thinking can happen intuitively, and synchronously as an interplay between the creative process and the research process, providing a space where research becomes enjoyable for design-based thinkers.

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Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

AI, Alexander, and architecture

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Abstract

This research reflects on the future of artificial intelligence (AI) technologies and Pattern Theory in architectural and design education and how it may inform the design process, projects, assessments, and research in this space. We are increasingly bombarded by new technologies and an abundance of information. The rapid evolution of AI has created many uncertainties. Might AI take away our jobs? Will AI kill creativity? How will we know who has produced the work? How do we as educators and students make sense of these technologies and use it (or not) in our education and practice? Can we possibly discover through AI new tools and possibilities and ways of working that contribute positively to what we do?

This paper explores student experience, reflections, and perceptions on the use of AI in a third-year history-and-theory of architecture course. Students were required to use AI word and image generators as part of an assignment that focused on the book *A pattern language* by Christopher Alexander. The students unpacked the 253 patterns in *A pattern language* through AI word and image generators and critiqued the results in comparison to their own hands-on analysis developed through physical models and hand-drawings.

Alexander's book *A pattern language* is a seminal architectural text and has, since its publication in 1977, not only influenced architectural education, but also inspired the use of pattern methodologies in computer programming. When invited to speak at a computer software conference, Alexander (1996, para. 74) envisioned a world where "computers (could) play a fundamental role in making the world – and above all the built structure of the world – alive, humane, ecologically profound, and with a deep living structure". Alexander's idea and methodology of patterns and pattern languages have also been applied in many other disciplines.

This paper also introduces Pattern Theory (Leitner 2015) as an extension of Alexander's work and comments on its potential for developing new ways of working in architectural education, practice, and research that could balance human and machine intelligence and that might result in more humane, ecologically profound, and living structures, as envisioned by Alexander.

Keywords: Architectural education, artificial intelligence, Christopher Alexander, Pattern Theory.

A is for...

Alpha. We are at the alpha-phase of artificial intelligence (AI). And we are at the beginning of a rapidly changing, sometimes highly confusing, and simultaneously very exciting time in the world.

As if the recent and rapid pivot online in response to the COVID-19 pandemic was not enough, we now have generative AI tools that update and exponentially multiply on a minute-by-minute basis. How do we stay abreast, never mind ahead? The result of this research is probably already outdated when seen as part of an AI-timeline, but I will amble forward.

AI is criticised for not understanding the human condition (Gillani et al. 2023), for not displaying emotional awareness, intelligence, or subjectivity, and for having a limited perception of context with no ethical or moral considerations (Ray 2023). In response, this paper aims to be human. Lest we get perturbed by the assertions made by people like Dickinson that:

Artificial intelligence (AI) might just eliminate architecture as a career for those who are not versed in the things that only humans can do: synthesise, channel, invent, craft. Beyond imitation. By its new nature, architecture could be becoming inhuman (2020, para. 1).

There has already been much debate about the use of AI in education. Whether we should allow it, even encourage it, or outright ban and police it. As Gillani et al. (2023, p. 99) puts it, the “political, pedagogic, and practical implications” of AI still requires a lot of discussion. I support the position that AI should be viewed as a tool, that it is with us to stay, and that we need to find ways to ethically introduce AI into our own and our students’ practice, ways that “could actually help prepare students for the real world” (Abrahams 2023, para. 13).

This research reflects on the future of AI technologies and Pattern Theory in architectural and design education and how it may inform the design process, projects, assessments, and research in this space. The link between Christopher Alexander and computer technology is also foregrounded. The paper is structured through a series of A-sections. The section, Approach, gives an overview of the research process and methodology. The next section provides context on AI, technology, and architecture. Three sections follow with background on Christopher Alexander. These are Alexander and *A pattern language*, Alexander and the language of computers, and Alexander, Leitner and Pattern Theory. The following section, Assignment 1, outlines the student assignment on which this paper is based. The section Analysis and appraisal discusses the student reflections, and the section Ahead we go beta is waiting, concludes the paper.

Approach

In the beginning of 2023, I had to develop a history-and-theory semester course for third-year architectural students in a Bachelor of Architecture degree. The broad aim of the course curriculum is to “foster knowledge and a critical perspective of current practice and theory in architecture and urbanism” (Delpont 2023). At the time, the world was abuzz about AI, specifically fuelled by the release of ChatGPT in November 2022, and the world is still abuzz. I wanted to include AI in the history-and-theory course, taking the approach of exposing students to AI tools and having them reflect on the responsible use thereof to encourage critical engagement. I had been following the development of AI and the possible applications in architectural (and other) education and was cognisant of Ceylan’s (2021, p. 101) sentiment that we need “a fundamental understanding [...] that considers AI as a basic and natural element of architectural education”.

The aim of this paper is to explore students’ experiences, reflections, and perceptions on the use of AI generative tools in a third-year history-and-theory course in a Bachelor of Architecture degree. Students were required to use AI word and image generators as part of an assignment that focused on the patterns in *A pattern language* (Alexander 1977). The goal is to initiate discussion and further

research about the role of AI in design education with Pattern Theory (Leitner 2015) as a developmental and interpretive lens, with a reminder of role and relevance of Christopher Alexander.

Design-based research and Pattern Theory were considered for the development of the history-and-theory course and for this research. Design-based research is fundamental to the architectural design process (and those of other design disciplines). Design-based research resonates with an explorative approach to educational practices and innovations in real contexts, emphasising iterative refinement and the potential for theory development (Anderson & Shattuck 2012). Pattern Theory was adopted as an underpinning lens. Pattern Theory builds on the seminal work, *A pattern language* (Alexander 1977) a seminal architectural text has, since its publication, not only influenced architectural education, but also inspired the use of pattern methodologies in many other disciplines, including computer programming.

AI, technology, and architecture

Architects explain their thoughts, process, and designs through representation. Representation usually takes the form of drawings or models. Architecture students are encouraged to learn representation by using hands-on methods, with pen or pencil on paper and models made of cardboard. Educators have serious debates about where in the design process the appropriate or beneficial time is to introduce ‘the computer’. Pallasmaa (2017) argues that the hand is not merely a tool but a source of embodied knowledge. Most educators support this view and believe that hands-on exploration through sketches and drawings is an essential as part of the conceptual stage of the design process.

Technology for representation has mostly benefitted the production or documentation stage of the design process; this is after the conceptual stage. Draughting technologies enabled more precise documentation, starting with the drawing board and the invention of blueprints and photostat machines. Towards the end of the last century computer technologies revolutionised production speed through 2D CAD, which started basically as an online drawing board.

Since then, computer technology has evolved rapidly, and AI technologies have been with us for a while. AI already assists the research process by working through huge amounts of data, AI tests form development through software that produces variables, including parametric architecture, Grasshopper, etc., AI is inherent in building information modelling (BIM) that assists in collaboration, application, and analysis of energy, systems, services, and the construction of these, and in the presentation of ideas, through software such as Lumion, etc. (Ceylan 2021).

The use of AI technologies to design and develop a building from start to finish with full documentation is still somewhere in the future. The complexity of architectural design is not yet grasped by AI, specifically at the conceptual and design development stages of the process. There have been attempts to codify the design process, amongst these through “deep neural network(s) [...] that extracts design into essential building blocks” (As, Pal & Basu 2018, p 1), but we are not there yet.

Generative AI images developed from text prompts may provide provocative visuals, but developing well-informed conceptual ideas has up to now not been the strength of ‘the computer’. AI building images consciously and unconsciously plagiarise, for example, buildings that all look like Zaha Hadid designs, and reflect inherent bias or stereotyping prompted with words such as ‘African’ or ‘European’ (Maganga 2023) and typically does not consider physics, structure (Kudless 2022) or spatial realities. These images are not directly translatable into buildings but may provide inspiration.

Alexander and *A pattern language*

A pattern language was developed and written by Christopher Alexander and several colleagues. It was first published in 1977 and proposed a fundamentally new approach to architectural design, based on the concept of patterns. The patterns in *A pattern language* were based on observations of (perceived) successful architectural and urban spaces, as well as on more abstract concepts from disciplines such as psychology and sociology. The patterns represent an attempt to capture the essence of what makes places feel alive. The authors argued that by understanding and implementing these patterns, anyone would be able to identify and solve design problems in their own contexts. Alexander's intent was to democratise design, making the process accessible to all, not just professionals in the field.

The book set out 253 distinct patterns, each representing a common solution to a repeating design problem. The patterns include a description of a particular problem, the context in which it arises, and a solution, illustrated with diagrams and photographs. For example, Pattern #159, LIGHT ON TWO SIDES OF EVERY ROOM, identifies the problem that rooms with light on only one side create a harsh and unwelcoming environment (Alexander 1977, p. 746). The solution, therefore, is to design rooms where there is light coming from at least two sides. One of the key ideas of the book is that the 253 patterns are all interconnected and that together it forms a 'pattern language'. This 'pattern language' can be used to generate designs that respond to contexts.

Of course, *A pattern language* is not without its share of critique. Many architects view *A pattern language* as too prescriptive, including "deterministic and authoritarian" (Bhatt 2019) or as naïve and romantically irrelevant (Mehaffy 2022). Alexander's own work, including the four-volume *Nature of order*, has however developed the pattern methodology further and others have also taken the work forward, such as Salinger with his book *A theory of architecture* (n.d.).

Alexander and the language of computers

The pattern structure set out in *A pattern language* was instrumental in the development of computer program languages, and Alexander was a revered and respected figure in computer circles (Coplien 1996). The evolution of object-oriented programming (ibid), which shares conceptual similarity with Alexander's idea of patterns, aligned with the application of the pattern language concept to software design. Alexander already wrote a computer program as early as the early 1960s (Matt 2021, par 3) and is directly credited with having influenced technology for the development of Wikipedia and games such as Sim City (Mehaffy 2022). Alexander criticised the separation of math and computers from human creativity and believed that "a designer could only successfully solve [...] problem(s) by combining his creativity with the analytic and computational power of machines" (Matt 2021, par 3).

When invited to speak at a computer software conference, Alexander shared his vision of a world where "computers (could) play a fundamental role in making the world – and above all the built structure of the world – alive, humane, ecologically profound, and with a deep living structure" (Alexander 1996). Alexander, at this stage, was somewhat despondent since *A pattern language* had not had the impact on the built environment, he had hoped it would. He saw in the software engineers' potential allies that would be able to translate spatial knowledge patterns into programming that could enable the design buildings.

As pointed out earlier, we are not at a point yet where AI has the capacity to design buildings (it can produce images of buildings, and test and develop some formal resolutions) because of the complexity of the informants on design in the built environment, but I suspect that we will soon be there. And we

can only hope that this capacity will answer Alexander's vision of the creation of buildings and spaces that support human "well-being, our health, and even our capacity to survive" (Mehaffy 2022).

Alexander, Leitner and Pattern Theory

Pattern Theory, proposed by Helmut Leitner in 2015, takes the pattern concept beyond architecture. Leitner expanded this framework into a generalised theory that could be applied across various domains. Within Pattern Theory, the concepts of 'centre' and 'wholeness' are significant to understand. Both concepts originate with Alexander and do take books to unpack, starting with *A timeless way of building* that preceded *A pattern language*. Leitner explains Pattern Theory as the examination of the intrinsic relationships between elements within a living system (defined through 15 fundamental properties as developed by Alexander in *Nature of order*).

Here, the concept of centre is something that "has a meaning and a reason to exist" and "activities and exchange" (Leitner 2015, p. 29) both in the concrete and the abstract. Centres cannot exist without the whole and exist also because of the whole. Wholeness emphasises the idea of coherence in systems that transcend the sum of individual parts (centres) (Leitner 2015, p. 30).

Through wholeness, patterns emerge "by describing recurring solutions to problems" (Leitner 2015, p. 141). The patterns underpin the existence and development of the whole as well as the centres, while at the same time, the whole and the centres describe the development of the patterns. Leitner (2015, p. 141) defines a 'pattern' as "the solution to a problem in a design or application context. Patterns are shared as completed methodical descriptions intended for practical use by experts and non-experts" (Leitner 2015, p. 148).

Leitner (2015, p. 66) explains that patterns are very useful for designers. As abstracted solutions, the application of patterns can "increase [...] efficiency and save [...] many hours of work". Patterns are subjectively developed as generic "solutions to problems in context" (Leitner 2015, p. 67) and are dependent on the developer and the definition of the system it is a part of. Patterns occur as part of human culture and also as part of nature.

Leitner (2015, pp. 66-70) stipulates that a pattern description should have the following essential elements: pattern name, context, initial situation, problem, and the solution (to the problem). In addition, a pattern should refer to related patterns that form part of the system or pattern language in which the pattern exists and should include an explanation that indicates the reasoning with examples.

Assignment 1

The course assessment that forms the basis for the discussion of this paper was the first assignment in a first-semester architectural history-and-theory course for third-year students in a bachelor's degree. This assignment was introduced to students at the end of February 2023. In order to get a sense of whether students were already using AI tools, they were polled to indicate their use and exposure to ChatGPT at the time and their perception of whether they should be 'allowed' to use ChatGPT and similar AI tools in their academic output. I was under the impression that most of them would already actively be using ChatGPT and that they would support the use of AI tools in their academic output. I certainly had already been testing ChatGPT and was thinking about how to incorporate it into my teaching practice and I found it a hot topic in conversations I was having with academics and non-academics alike.

It was surprising to learn that of the 68 respondents in the poll. Only three had been using ChatGPT actively, two used it occasionally, nine used it only once or twice, 30 had heard of it but never used it, and 24 had never even heard of it. In other words, 35% of the respondents had never even heard of it. Also, surprisingly, 14 of the students (20%) thought they should not be allowed to use it in their work, while only 19 (28%) thought they should use it in their work and the rest were non-committal or wanted to know more before deciding.

Students had approximately three weeks to complete this assignment. They had to work in groups of three or four (30 groups) to explore the socio-geometric patterns of *A pattern language*. The assignment highlighted the interconnectedness of the patterns and encouraged students to consider the potential of both AI and pattern methodologies in their architectural practice. Students had to use AI generative tools, ChatGPT and an image generator and had to reflect on these.

The assignment had several distinct parts. Groups each had to select two patterns from *A pattern language*. Then they posed predefined questions to the AI generative text tool, ChatGPT. The questions investigated the principles of their selected patterns, as set out in *A pattern language*, and the local contextual applicability of the patterns. Students then evaluated the relevance and accuracy of the ChatGPT answers through group discussions and had to correct any answers that were not satisfactory (if any).

Next, they had to find two on-campus spaces that aligned with their chosen patterns. These spaces were documented through their own hands-on processes using photographs, diagrams, and physical models. They drafted narratives explaining the resonance between their chosen campus spaces and patterns.

They then used ChatGPT to create a prompt for an AI image generator that had to produce an image that reflected the essence of their patterns. They used the prompts to develop AI images and then had to adapt the prompt for several iterations to find suitable images. Most students used the very accessible DALL-E and some used Midjourney or Stable Diffusion. They had to evaluate the effectiveness of the images.

Lastly, the students wrote a reflective piece that touched on the current and contextual applicability of the socio-geometric patterns as well as the benefits and/or limitations of the AI tools used. The following section, 'analysis and appraisal', unpacks the student reflections.

Analysis and appraisal

Student reflections on their use of AI in Assignment 1 focused on four main aspects. These are information accuracy and the completeness of factual generated AI text; the applicability and relevance of interpretive questions put to ChatGPT; the effectiveness of ChatGPT generated image-prompts; and the effectiveness of their hands-on exploration (models and drawings) versus that of the images created by the AI image generator. The sub-headings below address each of the four aspects and the section concludes with general observations that emerged.

Information accuracy and “completeness” of factual generated AI text

There was general agreement (all groups) that ChatGPT was inconsistent in terms of accuracy and completeness of information. Although students used the same basic prompts (provided to them in the assignment) to generate answers about their two patterns, most found that in some instances ChatGPT provided fairly accurate and complete responses, while in other instances there were omissions of important information or downright inaccuracies. The following statements express the

sentiments, saying that the information was “accurate and summarised really well, although it was incomplete” (Group 15), “complete to an extent” (Group 11), and “points were omitted” (Group 2).

Applicability and relevance of interpretive questions

Again, there was general agreement (all groups) that ChatGPT was inconsistent. When ChatGPT had to find local contexts in which the patterns could be applied and write about the relevance of the patterns in contemporary South Africa, it could sometimes provide substantiated answers but at other times was off the mark.

According to students, if “the prompt is asked the exact way the brief suggests, the answer we receive is completely inaccurate” (Group 14) and “the example given doesn’t adhere to [...] the pattern and is a poor example” (Group 16). ChatGPT also sometimes “neglects [...] the social aspect” (Group 21) but at times “the response made an appropriate [...] reference” (Group 12). ChatGPT had to interpret the patterns for the South African context and Group 14 found, after adapting the prompts, that “AI demonstrates a full understanding of South African culture [...] heritage [...] economic context [...] poverty rates (and) climatic conditions”.

Effectiveness of ChatGPT-generated image prompts

The images generated with the ChatGPT-created prompts was almost in no instances satisfactory although a few groups said that the “sketches generated relate to the pattern” (Group 1). The alignment might also be related to the concrete or abstract nature of the specific pattern. One group reported that ChatGPT explained to them how a prompt should be written, rather than writing the prompt for them. It was clear from the images generated by the ChatGPT-created prompts that ChatGPT was not able to interpret the conceptual pattern information into a prompt for an image. Group 2 reported that the “images are graphically interesting but the link to (the pattern) is unclear”.

Comparison between the effectiveness of hands-on exploration vs an image generator

Students said that the AI image-generators provided value in terms of time (it is quick), but one group commented that you may spend so much time and energy on developing a useful prompt that making a hand drawing might be quicker. Other positives were that the image generator is a cost-effective way of generating many options. Most groups shared the sentiment that the images “often lacks human touch” (Group 21) and that image bias occurs because of the databases that are referenced.

Groups generally felt that their hands-on explorations were more effective than the AI-generated images. Specific comments of relevance here are that “handwritten and built models still have a better chance of being relatable and understood by humans” (Group 21), that one “can never devalue the power of hand drawings and model making” (Group 16) and that “hand-drawn allows exploration and findings on another level” (Group 22). The dominant feeling about the image generator is echoed in the comments of Group 1, who says that “accuracy, understanding, and meaning fall short” and “space and what it consists of do not carry meaning”.

General observations

Students were surprised by the introduction of AI generative tools in their history-and-theory course but found both ChatGPT and the AI image generators an exciting experience and want to continue using it. They expressed this opinion in written form in the assignment as well as in verbal interactions in class.

Students thought that AI text generators, such as ChatGPT, could allow them to see information from a different perspective. ChatGPT also proves to be valuable for summaries and the generation of information, although accuracy and consistency are often lacked. Students saw ChatGPT as a “potential to aid critical thinking” (Group 18) and a “valuable tool in the triangulation of knowledge” (Group 18) but on the other hand it has “no intuition” (Group 21).

The findings about accuracy and completeness of information were not surprising and resonate with comments in the media during March 2023 (the time of the assignment), that ChatGPT “sometimes provide nonsensical or inaccurate responses” (Marr 2023 par 3) and that “it still makes mistakes” (Metz & Collins 2023, par 10).

General observations for AI image generators were that, going forward, the ideal would be to combine AI and hand drawings and models. Group 5 motivated this as they saw the “process more or less the same”. However, Group 16 said that in terms of the design process it would be problematic if one relied on “using AI image(s) [...] as design solutions rather than deep critical evaluation of what the bigger picture architects attempt in resolving, socially and economically”.

Some students realised that the image-prompts had to be more descriptive of the image rather than of the concepts of the pattern and subsequently their own generated prompts provided better image results than the ChatGPT generated prompts. Prompt-engineering, for both AI text and image generators has since grown into a science by itself, with entire platforms dedicated to it and huge salaries being paid (Popli 2023).

Ahead we go... beta is waiting

This paper explored the students' experience, reflections, and perceptions on the use of AI generative tools in a third-year history-and-theory course for a Bachelor of Architecture degree. What was surprising was that the students found their own hands-on explorations so valuable in comparison to the AI-generated images. I would be lying if I did not say that this is what I hoped they would conclude. Although AI image (and text) generators will continue to develop, and improved prompts will produce better results, I believe that the hand as a thinking tool (Pallasmaa 2017) will continue to play an important role and that AI generators are simply a new set of the tools we will be using.

Moving forward, we need to view AI text and image generators as additional tools in our process, whether it is the process of answering an assignment or project, developing a course, curriculum, or future research. Conceptualising our (design) process and the tools we use through the lens of Pattern Theory and with an understanding of the values of Alexander, we could develop *A pattern language* that can guide us in this process.

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SESSION 8: Connecting





Vulindlela – making new pathways

17th DEFSA conference – 21|22 September 2023

Exploring non-placement work-integrated-learning (WIL) through industry-endorsed hybrid-curricular projects for fashion graduate success

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Abstract

To thrive in the fast-paced fashion industry, graduates must possess critical skill sets upon entering the workforce to ensure they are fully prepared for employment. This immediate need from the fashion industry necessitates that students gain practical, experience-based inputs from the fashion curricula pitched within the fashion higher education environment.

In line with the DEFSA theme “Vulindlela: making new pathways”, this paper investigates the “Learning: new approach to design education” subtheme through explorative research into work-integrated learning. The paper emphasises the importance of equipping fashion industry graduates with critical skills and practical experience to enhance their employability. A focused approach to fashion education, where modules within a set curriculum do not account for skills and knowledge transferability, no longer successfully prepares students for entry-level career opportunities. Moreover, implementing work-integrated learning poses challenges, such as securing appropriate placements and increasing student workload.

In a comprehensive literature review, the authors argue that fashion education curricula must incorporate a hybrid learning approach to work-integrated learning that bridges the gap between academic and industry requirements. They suggest that graduate success rates and employability will improve by reintroducing work-integrated learning, which involves industry contributions and project-based curricula with reputable fashion brands. A novel conceptual framework is proposed to overcome current challenges and enhance content relevance and student engagement. The researchers explore and define a conceptual framework that effectively includes an industry-endorsed hybrid-curriculum approach incorporating project-based, problem-based, theory-based work-integrated learning formats under a relevant brand umbrella. The aim is to create a sustainable pathway to increase student engagement and success in collaboration with the fashion industry.

Keywords: Fashion education, hybrid-curriculum projects, industry endorsed, non-placement wil, on-campus WIL, student engagement, work-integrated learning.

Introduction

In the dynamic and competitive fashion industry, the demand for skilled and industry-ready graduates is increasing (Leiby 2021; Modenlek 2019). Fashion higher education institutions in South Africa and worldwide face the critical task of preparing students with theoretical knowledge, practical skills, and industry experience (Du Preez, Van der Merwe & Swart 2019). Graduate employability is crucial for South Africa's socio-economic development and individual prosperity, and it bridges the gap between academic education and industry needs (Lubbe, Ali & Ritalahti 2021; Govender & Taylor 2015). However, traditional lecture-based teaching methods often fail to provide students with the hands-on skills and practical experiences demanded by the fashion industry, hindering their employment prospects (Leiby 2021; Govender & Taylor 2015).

To enhance graduate employability and student engagement, the integration of real-world experiences is essential (Darling-Hammond, Flook, Cook-Harvey, Barron & Osher 2019; Kahu 2013). Work-integrated learning (WIL) is a promising solution that allows students to apply theoretical concepts in practical contexts, fostering a deep understanding of the fashion industry and critical thinking skills (Stirling, Kerr, Banwell, MacPherson & Heron 2016; Billett & Billett 2015). Fashion education requires a WIL conceptual framework that reflects the industry's fast-paced and diverse nature, effectively preparing graduates for their roles (Pirzada 2022; Shin 2012).

Work integrated learning (WIL) is a crucial component of higher education that bridges the gap between classroom learning and real-world experience. Non-placement or on-campus WIL typically involves students participating in practical learning activities within the university or college premises, such as labs, workshops, or simulated environments. This approach allows students to gain hands-on experience while still on campus. In contrast, placement WIL also referred to as off-campus WIL takes students into external organisations, giving them the opportunity to apply their academic knowledge in real-world settings (Fleischmann 2015). This type of WIL often involves internships, co-op programmes, or industry placements, enabling students to develop valuable skills, build professional networks, and gain insights into their chosen field. Both on-campus and off-campus WIL are vital in preparing students for successful careers by blending theory with practical application.

Placement WIL, where students take on formal internships during their studies comes with multiple challenges, especially in fashion-specific industry roles that require an elevated level of skill upon entry (Fleischman 2015; Shin 2012). Non-placement WIL includes the use of methods that incorporate industry relevance into the curriculum while providing the challenge of including relevant industry-simulated experiences that practically develop the plethora of hard and soft skills in demand (Fleischman 2015; Dean, Eady & Yanamandram 2020).

While extensive research has been conducted on WIL methods and their benefits, there is a gap regarding the successful inclusion of WIL in fashion education (Tezcan et al. 2020, Leiby & Zhao 2020; Du Preez et al. 2019). The research paper addresses this gap by first conducting a literature review to analyse and interpret the existing and current WIL practice and secondly, based on the research reviewed, exploring work-integrated learning (WIL) through endorsed hybrid-curricular projects for fashion graduate success. The researchers unpack and propose a conceptual framework that offers a method of incorporating non-placement WIL for fashion education that fosters industry collaboration to ensure relevant real-world problems are used in real-time projects, building necessary graduate attributes and skills desired by the fashion industry within a safe, meaningful learning environment (Shin 2012; Smith, Russel & Ferns 2014; Fleischman 2015).

The paper aims to provide valuable insights and recommendations to educators, policymakers, and industry stakeholders, emphasising the need to effectively bridge the gap between fashion education and the fashion industry to enhance student engagement, graduate success, and employability through a meaningful application of non-placement WIL.

Research problem

The fashion industry is experiencing significant challenges and changes, requiring graduates to possess high-level skill competencies (Leiby 2021). Employability is crucial for graduates to establish and advance their careers, adapt to industry demands, and maintain long-term employability and career sustainability (De Vos, Jacobs & Verbruggen 2021).

In South Africa, the need to increase employment by 2030 is motivating higher education institutions to find innovative ways to equip graduates with industry-relevant skills, behaviours, attitudes, and attributes (Govender & Taylor 2015). Enhancing graduate employability in South Africa can lead to economic growth, reduced inequality, and addressing high youth unemployment rates. Skilled and job-ready graduates contribute to a more competitive labour market, attracting local and foreign investment, as well as promoting innovation and entrepreneurship (Govender & Taylor 2015). However, fashion higher education institutions face challenges in implementing WIL due to factors such as student workload, costs, time constraints, and the availability of appropriate industry placement opportunities (Shin 2012).

Objective 1

To explore and define a relevant non-placement WIL conceptual framework for fashion education.

Objective 2

To create a non-placement WIL conceptual framework that supports fashion student engagement and graduate workplace readiness for fashion industry needs.

Literature review

The literature review defines and explores relevant research, providing definitions of key topics and ideas to give a deeper meaning and understanding to the topic.

Fashion industry climate

The global fashion industry faces various challenges, including the consequences of the COVID-19 pandemic, interest rate fluctuations, uncertain energy supply, geopolitical disruptions, and evolving consumer behaviour (Amed, Balchandani, Beltrami, Hedric & Rolkens 2022). In response to these macroeconomic developments, fashion brands could reassess their manufacturing, distribution, and marketing practices (Ahmed et al. 2023). The State of Fashion 2023 report highlights the turbulence and uncertainty in the industry, emphasising the importance of integral skills development for graduates of fashion education (Ahmed et al. 2023).

Critical thinking, problem solving, knowledge application, interpersonal skills, self-direction, resourcefulness, and effective communication are identified as essential skills in the constantly changing workplace (Darling-Hammond et al. 2019). Success in the fashion industry requires higher-order learning, metacognition, resilience, curiosity, independent learning, collaboration, creativity,

and self-regulation (Peart 2019). Developing these skills involves applying knowledge to new situations, collaborative problem solving, and inquiry-based learning (Darling-Hammond et al. 2019).

The fashion industry's technological advancements and customer-centric business models have created a need for new skills across departments, particularly cross-functional skills that enable collaboration across various functions within a fashion retail environment (Leiby 2021; Modenlek 2019; Leiby & Zhao 2020). A study on merchandising roles in the South African fashion retail industry emphasises the interconnectivity of fashion merchandising departments in achieving profit strategies (Jacobs & Karpova 2022). This paper proposes the incorporation of a fashion retail brand-endorsed hybrid-curricular projects in fashion higher education to include non-placement WIL, fostering meaningful learning and preparing fashion graduates adequately for the fashion industry.

Fashion education context

With the Fourth Industrial Revolution (4IR) influencing societies globally, there is an expectation among students at higher learning institutions to participate in non-traditional and highly engaging learning methods. Kolb and Kolb (2017) emphasise the need to establish learning spaces that stimulate inquiry, open minds, and facilitate good learning conversations, enabling participants to move from experience to deep reflection, conceptualisation, and action, thereby developing a supportive WIL environment.

A study focused on WIL education in Fashion Design highlights the significance of creating an appropriate learning environment that emphasises skill acquisition, ensuring students are equipped with the necessary competencies to thrive in the 4IR fashion industry. Additionally, the study emphasises that WIL plays a vital role in student learning, particularly within applied arts and science departments (Shin 2012).

South Africa's National Development Plan and Vision for 2030 underscore the need for improved collaboration between the government, education sector, and industry to address the unemployment rate (South African Government 2012). The South African education system is governed by various bodies that exert substantial influence over curriculum development and implementation in higher education institutions. The Council of Higher Education (CHE), in conjunction with the National Qualification Conceptual framework (NQF), has oversight over the entire education evaluation process, from design to delivery, within the South African higher education system (CHE 2022). The unique South African context highlights the importance of eliminating discrimination and enhancing the education landscape to ensure equal access for all students and provide them with fair opportunities for future success (CHE 2022). Emphasis is placed on implementing effective experiential learning modules and WIL strategies to bridge the gap between higher education and graduate readiness. However, there is limited research on the most efficient approach to align the distinctive needs of the South African fashion industry with the skills development initiatives in fashion education institutions.

A crucial element of successful non-placement WIL implementation in fashion higher education is the partnership established with industry. Seifer (2002), cited in Stirling, Kerr, Banwell, MacPherson, and Heron (2016), recommends involving industry partners in the planning, designing, implementing, evaluating, and celebrating of WIL activities to ensure their effectiveness and relevance. The fashion retail brand (industry) endorsement can be facilitated through relevant, well-intentioned, and applicable fashion brand(s) – from small entrepreneur fashion brands to multinational fashion companies. Before implementing the education institute's learning and teaching strategy, the fashion brand(s) review the curricula and project briefs or work together with the institution to develop

curricula and project briefs that develop and test the skills needed by graduates when entering the workplace. In order to stay updated with industry changes, this endorsement might only apply for one academic calendar cycle unless otherwise agreed upon.

Fashion student engagement and success

WIL is closely linked to student engagement as it allows students to immerse themselves in real industry settings, collaborate with professionals, and work on authentic projects (Smith, Russel & Ferns 2016; Smith et al. 2014). This engagement not only enhances learning outcomes but also has the potential to establish transferable skills, professional networks, confidence, and self-efficacy (Mebert, Barnes, Dalley, Gawarecki, Ghazi-Nezami, Shafer, Slater & Yezbick 2020; Kahu 2013).

The paper recognises that students' ability to learn and develop is influenced by their malleable cognitive system and the activation of neural pathways in the brain (Darling-Hammond et al. 2019). By integrating an authentic learning perspective through WIL, student engagement and success can be achieved. Student engagement, which includes effort, persistence, concentration, and emotional responses, is considered crucial for student success (Bowden, Tickle & Naumann 2021).

To prioritise student engagement, the proposed WIL conceptual framework suggests incorporating multiple avenues into the curriculum, such as project-based learning, problem-based learning, and theory-based learning (Bowden et al. 2021). These approaches aim to holistically address cognitive, emotional, and behavioural aspects of student engagement within the WIL experience.

Work-integrated learning background and theory

The paper discusses WIL as a pedagogic methodology that facilitates the transition from being students to being employees (Khampirat, Pop & Bandaranaike 2019). WIL is a form of experiential learning that involves learning tasks resembling real workplace tasks (Oliver 2015). Experiential Learning Theory (ELT) is a dynamic theory that focuses on adult development and defines education as a process involving the whole person (Kolb & Kolb 2017). ELT emphasises student-centred learning through dynamic classroom interactions (Doolan, Piggot, Chapman & Rycroft 2019). The theory acknowledges different learning styles and emphasises the importance of combining thinking, experiencing, acting, and reflecting for flexible learning (Kolb & Kolb 2017).

WIL aligns with the stakeholder-centric model, which considers the needs and perspectives of all stakeholders involved, including students, employers, and educational institutions (Effeney 2020). This model emphasises clear communication, shared objectives, and feedback systems for continuous improvement. The benefits of WIL, according to Stirling et al. (2016) and Effeney (2020), include fostering critical reflection, translating theory into practice, developing new concepts, promoting self-directed learning, adapting to a changing work environment, improving academic success, and developing professionalism and time management skills. WIL also provides opportunities for networking and collaboration.

While existing WIL models primarily focus on industry recruitment, securing workplace placements can be complex. Students have indicated that placements significantly influence their success in WIL approaches (Gribble, Dender, Lawrence, Manning & Falkmer 2014). Innovative forms of WIL, such as world-of-work simulations or non-placement WIL, can address this challenge (Dean, Eady & Yanamandram 2020). Therefore, WIL is seen as an umbrella concept that encompasses project-based learning, problem-based learning, and theory-based learning.

Project-based learning

Project-based learning (PBL) is an educational approach that emphasises learning by doing, as proposed by Dewey (1938), who recognised the benefits of experiential education. In PBL, students work on real-world problems and complex challenges, translating theory into practical experiences and taking control over project development and delivery (Karim, Campbell & Hasan 2019; Fleischmann 2015; De Graaff & Kolmos 2007; Dewey 1938). PBL is a collaborative and long-term initiative that aims to improve socio-economic and environmental factors (Panitz & Panitz 1998).

PBL and WIL share a focus on experiential educational practices. While PBL has been shown to enhance student learning and engagement (Karim et al. 2019; Kokotsaki, Menzies & Wiggins 2016), when combined with WIL, the outcomes are further enhanced. In project-based WIL, students engage with real-world problems and collaborate directly with industry partners, effectively advancing their work-related skillset (Karim et al. 2019).

Industry-endorsed project-based WIL provides students with an immersive environment where they develop skills in team collaboration, project management, problem solving, and critical thinking. These skills are particularly crucial when entering the fashion industry or any other field where practical application and collaboration are essential.

Problem-based learning

Problem-based learning (PBL) is an educational approach that presents students with novel problems to solve, requiring them to generate solutions (Fradila, Razak, Satosa, Arsih & Chatri 2021; Panitz & Panitz 1998). PBL immerses students in an environment where they must refine and restructure their knowledge gained from theory-based learning to address these novel problems (Tan 2021). The approach emphasises cross-disciplinary knowledge integration as problem solving often requires the application of knowledge from different subjects and topics (Tan 2021).

The PBL environment fosters the development of argumentative, investigative, reflective thinking, and collaborative skills (Fradila et al. 2021). PBL also promotes self-directed learning, as students take ownership in identifying knowledge gaps and acquiring the necessary information to solve the presented problem (Moallem, Hung & Dabbagh 2019). This process of self-directed learning aligns with the development of lifelong learning skills, which are crucial in the world of work.

Previous studies have demonstrated that PBL increases student motivation and engagement (Moallem et al. 2019; Schmidt 1993). When students encounter a novel problem, a knowledge gap is evident, stimulating their exploratory behaviour and interest in investigating and solving the problem (Moallem et al. 2019). This phenomenon is known as the "knowledge-deprivation hypothesis of situational interest" (Moallem et al. 2019).

In summary, PBL engages students in solving novel problems, fosters cross-disciplinary knowledge integration, develops critical thinking and collaborative skills, promotes self-directed learning, and enhances student motivation and engagement.

Theory-based learning

Theory-based learning (TBL) within the context of WIL involves integrating academic theory with practical experience, following a process-based learning model that includes planning, execution, observation, and reflection (Anuradha 2020). It allows for both inductive and deductive learning, enabling students to apply theoretical concepts to real-world work scenarios (Stirling et al. 2016). One of the benefits of WIL is the opportunity for students to put theory into practice and recognise the

relevance of concepts learned in school for the workplace (Govender & Wait 2017). In order to effectively integrate theory and practice, workplace case studies and simulations are embedded within the curriculum, exposing students to both practical and theoretical elements of the workplace (Stirling et al. 2016).

Implementing TBL in WIL can be approached through targeted methodology, where WIL activities are aligned with specific module learning outcomes to enrich the learning experience (Stirling et al. 2016). Higher education institutions can incorporate TBL by introducing industry-related case studies into lessons and projects, as well as inviting industry experts as guest lecturers to demonstrate the connection between theory and practice (STADIO 2020). However, Kolb and Kolb (2017) argue that many applications of experiential learning in higher education fail to effectively bridge the gap between theoretical learning and experiential activities. Therefore, TBL alone may not provide the comprehensive learning conceptual framework required for a simulated workplace experience.

By incorporating TBL into the WIL conceptual framework, the curriculum can establish meaningful connections between academic content and industry expectations, fostering continuous learning in a supportive environment (STADIO 2020). This integration of theory and practice ensures that graduates possess up-to-date knowledge relevant to the workplace.

Hybrid learning

Hybrid learning in the context of fashion higher education incorporates elements of project-based, problem-based, and theoretical-based learning, promoting interdisciplinary collaboration (Sultana & Chaudhuri 2019). It is a result of cross-curriculum and interdisciplinary collaboration within the field of fashion education. In the literature, hybrid project-based learning is explored through four definitions that help articulate the concept of WIL. These definitions include interactive learning, collaborative learning, interdisciplinary collaboration, and industry-endorsed hybrid-curriculum learning (Sultana & Chaudhuri 2019). Hybrid learning in fashion education encourages the integration of various learning approaches and disciplines to provide students with a comprehensive and interdisciplinary educational experience.

Interactive learning

Interactive learning in higher education is a holistic approach that bridges the gap between theory and practical application, aiming to develop student success and preparedness for the industry (Woodside 2018). It combines academic knowledge with practical skills, ensuring students are equipped with the necessary attributes such as collaboration, communication, and critical thinking (Woodside 2018). These skills are highly valued by employers (Govender & Taylor 2015; Shin 2012). Interactive learning is often referred to as "the win-win model" for collaboration between higher education institutions and industry (Pogatsnik 2018). Case studies have demonstrated the effectiveness of interactive learning in achieving programme outcomes and improving teamwork and soft skills (Pogatsnik 2018; Li, Lui, Yang & Yu 2017). Collaboration between academia and industry, such as through workplace shadowing initiatives, enhances the quality of learning by integrating theoretical skills into real-world practice (Jensen, Fumasoli & Stensaker 2020; Lehtinen & Aaltonen 2020). However, there is a need to further integrate practical teaching and learning practices into module and curriculum development to create a more cohesive and comprehensive approach (Woodside 2018).

Collaborative learning

Collaborative learning promotes peer-to-peer learning, leading to increased engagement and the development of problem-solving skills (Scager, Boonstra, Peeters, Vulperhorst & Wiegant 2016). There

is a growing demand for collaborative learning practices in education, aiming to foster in-class collaboration and peer-integrated learning (PIM) (Heeg, Hundertmark & Schanze 2020). Adding industry endorsement to in-class collaboration can enhance the immersive experience and contribute to the development of a non-placement WIL conceptual framework that supports student engagement and workplace readiness.

A study by Panitz and Panitz (1998) aligns with the objective of creating a non-placement WIL conceptual framework by recognising that collaborative learning integrates pedagogical models such as problem-based learning, project-based learning, and inquiry-based learning (CHE 2022; Panitz & Panitz 1998). Furthermore, Fleischman (2015) investigated on-campus (non-placement) WIL within the creative education context using industry clients within the project-based learning framework, culminating in a successful student engagement response and noting the value add to student success from this approach. Similarly, in the context of fashion education, project-based learning is a suitable method, making it a plausible learning outcome within the proposed non-placement WIL conceptual framework (CHE 2022; Panitz & Panitz 1998).

Interdisciplinary collaboration

Interdisciplinary collaboration in education aims to align the outcomes of modules within a curriculum, enhancing student comprehension. It offers numerous benefits to students, enriching their learning experience and increasing attendance and morale towards modules (Kelly, McLoughlin & Finlayson 2020). Higher education institutions should incorporate collaboration as a learning outcome in the development of projects to foster real-world working environments (Kelly et al. 2020). Stokols, Hall, Taylor, and Moser (2008), as cited by Kelly et al. (2020), proposed a categorisation of group tasks based on the degree of integration achieved. These categories include uni-disciplinary, multidisciplinary, interdisciplinary, and transdisciplinary integration. Uni-disciplinary tasks focus on one discipline, while multidisciplinary tasks involve multiple disciplines operating independently. Interdisciplinary tasks involve collaborative operation among multiple disciplines, and transdisciplinary tasks require multiple disciplines to collaborate to achieve a common goal (Stokols et al. 2008, cited by Kelly et al. 2020).

Industry-endorsed hybrid-curriculum learning

Industry-endorsed hybrid learning in higher education combines interactive learning, collaborative learning, and interdisciplinary learning as an innovative strategy for development (Kelly et al. 2020; Heeg et al. 2020; Pogatsnik 2018; Woodside 2018). It encourages collaboration among modules across different disciplines to create an ecosystem. Kolb and Kolb (2017) suggest designing a curriculum that aligns instructional techniques and activities with subject matter and module objectives using the four learning modes. An example of industry-endorsed hybrid-curriculum learning in a South African fashion institution involves integrating project-based, problem-based, and theory-based learning with industry endorsement (STADIO 2020). This integration aims to create an immersive experience, combining theoretical and practical concepts in project-based tasks to enhance student employability and community engagement (STADIO 2020). Figure 1 illustrates how fashion-related modules are integrated within the institution and their relationship to industry operations. According to Darling-Hammond et al. (2019), cognitive science suggests that learning is more effective when ideas are conceptually connected and when students are fully engaged and motivated by intriguing work. Interest in learning also supports academic resilience and perseverance in challenging situations (Darling-Hammond et al. 2019).

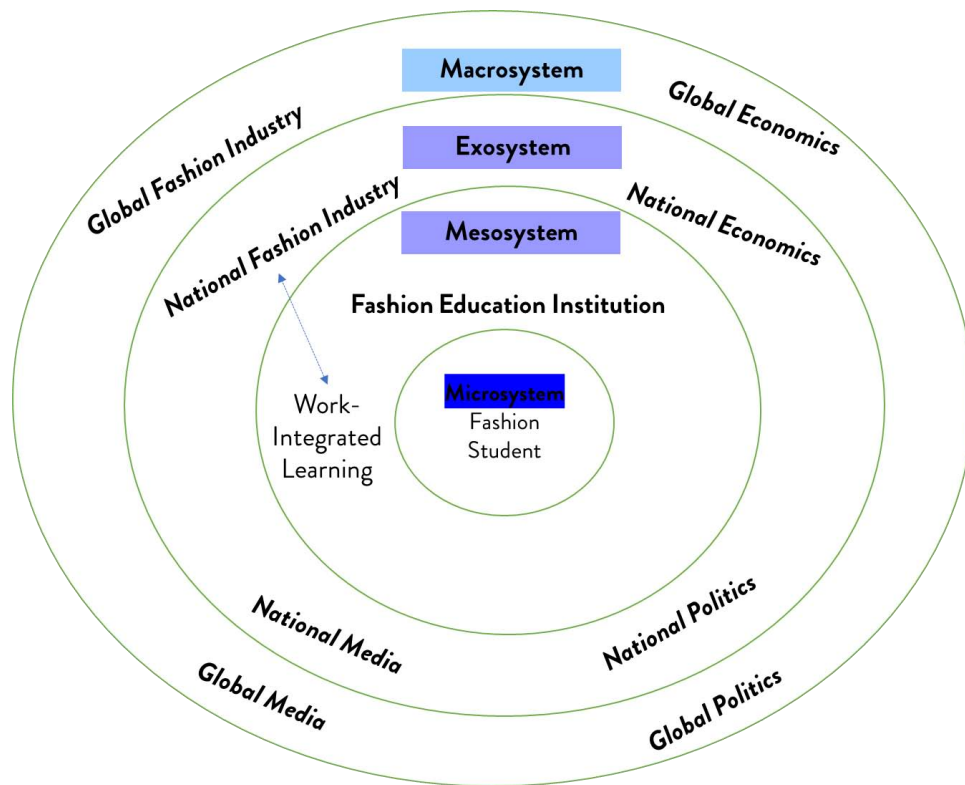


Figure 1: Model of the systems in which fashion students exist in relation to work-integrated learning (Bergh & Geldenhuys 2018, p. 71)

Methodology

The chosen methodology for this paper is a comprehensive literature review, which integrates findings and perspectives from multiple empirical studies to address research questions with a powerful synthesis (Snyder 2019). The review aims to identify areas where more research is needed and provides a meta-level view of the topic (Snyder 2019). Given the lack of focus on synthesising WIL in the fashion education curriculum, considering the unique challenges and contextual elements of the fashion industry, a comprehensive literature review is particularly relevant for this study (Snyder 2019).

The comprehensive literature review process is rooted in the constructivist paradigm, which acknowledges that a phenomenon can be understood through multiple perspectives (Onwuegbuzie & Frels 2016). This paper takes an explorative approach, using a constructivist-based literature review that involves inductive reasoning, rich data description, and reflectivity (Onwuegbuzie & Frels 2016).

The methodology involves four phases: designing the literature review, conducting the review of existing literature, analysing the literature, and writing up the literature review (Snyder 2019). The paper adopts a mixed methods approach, utilising both qualitative and quantitative methods to analyse the collected data. The sub-topics covered in the paper are outlined in a table, along with a list of authors under each sub-topic, and the percentage indicates the amount of data used for each sub-topic in the paper (Snyder 2019).

Table 1: Literature conducted on work-integrated learning within higher education

Sub-Topic	Author	Percentage contribution
Fashion Industry Climate	Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B. & Osher, D. 2019 Modenlek, A. 2019 Peart, N. 2019 Leiby, N. & Zhao, L. 2020 Leiby, N.R. 2021 Jacobs, B. & Karpova, E. 2022	13%
Fashion Education Context	Shin, K. 2012 South African Government. 2012 Stirling, A., Kerr, G., Banwell, J., MacPherson, E. & Heron, A. 2016 Kolb, A.Y. & Kolb, D.A. 2017 CHE. 2022	11%
Fashion Student Engagement and Success	Dewey, J. 1938 Panitz, T. & Panitz, P. 1998 De Graaff, E. & Kolmos, A. 2007 Kahu, E.R. 2013 Kokotsaki, D., Menzies, V. & Wiggins, A. 2016 Smith, C., Ferns, S. & Russell, L. 2016 Stirling, A., Kerr, G., Banwell, J., MacPherson, E. & Heron, A. 2016 Govender, C. & Wait, M. 2017 Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B. & Osher, D. 2019 Karim, A., Campbell, M. & Hasan, M. 2019 Mebert, L., Barnes, R., Dalley, J., Gawarecki, L., Ghazi-Nezami, F., Shafer, G., Slater, J.A. & Yezbick, E.L. 2020 Moallem, M., Hung, W. & Dabbagh, N. 2019 Anuradha, K. 2020 STADIO, 2020 Bowden, J.L.-H., Tickle, L. & Naumann, K. 2021 Fradila, E., Razak, A., Satosa, T.A., Arsih, F. & Chatri, M. 2021 Tan, O.-S. 2021	39%

Work Integrated Learning	<p>Dewey, J. 1938 Panitz, T. & Panitz, P. 1998 De Graaff, E. & Kolmos, A. 2007 Shin, K. 2012 Gribble, N., Dender, A., Lawrence, E., Manning, K. & Falkmer, T. 2014 Oliver, B. 2015 Kokotsaki, D., Menzies, V. & Wiggins, A. 2016 Scager, K., Boonstra, J., Peeters, T., Vulperhorst, J. & Wiegant, F.A.C. 2016 Stirling, A., Kerr, G., Banwell, J., MacPherson, E. & Heron, A. 2016 Govender, C. & Wait, M. 2017 Kolb, A.Y. & Kolb, D.A. 2017 Rands, M.L. & Gansemer-Topf, A.M. 2017 Pogatsnik, M. 2018 Woodside, J.M. 2018 Karim, A., Campbell, M. & Hasan, M. 2019 Khampirat, B., Pop, C. & Bandaranaike, S. 2019 Moallem, M., Hung, W. & Dabbagh, N. 2019 Anuradha, K. 2020 Dean, B., Eady, M.J. & Yanamandram, V. 2020 Effeney, G. 2020 Fleischmann, K. 2015. Heeg, J., Hundertmark, S. & Schanze, S. 2020 Kelly, R., McLoughlin, E. & Finlayson, O.E. 2020 Lehtinen, J. & Aaltonen, K. 2020 Li, Y., Liu, X.-L., Yang, J.-J. & Yu, W.-X. 2017 Jensen, K., Fumasoli, T. & Stensaker, B. 2020 STADIO, 2020 Tezcan, N., Durakovic, I., Lloyd, E. & D'arcy, S. 2020 Fradila, E., Razak, A., Satosa, T.A., Arsih, F. & Chatri, M. 2021 Tan, O.-S. 2021</p>	67%
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Hybrid Learning	<p>Shin, K. 2012 Scager, K., Boonstra, J., Peeters, T., Vulperhorst, J. & Wiegant, F.A.C. 2016 Govender, C. & Wait, M. 2017 Li, Y., Liu, X.-L., Yang, J.-J. & Yu, W.-X. 2017 Pogatsnik, M. 2018 Woodside, J.M. 2018 Heeg, J., Hundertmark, S. & Schanze, S. 2020 Jensen, K., Fumasoli, T. & Stensaker, B. 2020 Kelly, R., McLoughlin, E. & Finlayson, O.E. 2020 Lehtinen, J. & Aaltonen, K. 2020 STADIO, 2020</p>	24%
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Conceptual framework

The derived conceptual framework, based on the literature review, presents an argument that a relationship exists between the investigated concepts (Onwuegbuzie & Frels 2016). The review of the literature, as presented in Table 1, leads to a proposed conceptual framework that combines project-

based learning, problem-based learning, and theory-based learning under the endorsement of a relevant umbrella brand in the fashion industry (Onwuegbuzie & Frels 2016). The conceptual framework presents a possible WIL format for fashion education and the importance of industry-endorsed hybrid-curriculum learning that engages fashion students through an industry-endorsed hybrid-curriculum and prepares them for the workplace, ultimately promoting their employability as graduates (Onwuegbuzie & Frels 2016).

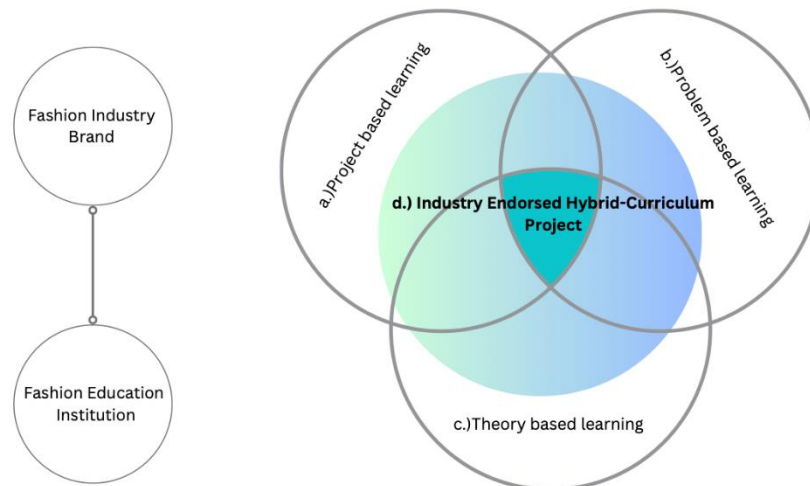


Figure 2: Conceptual framework for non-placement industry-endorsed hybrid-curriculum projects

Conclusion and recommendations

In conclusion, the paper provides a comprehensive literature review and analysis to define an effective non-placement WIL conceptual framework for fashion higher education. The proposed conceptual framework combines project-based, problem-based, and theory-based learning through an industry-endorsed hybrid-curriculum learning approach, incorporating an umbrella fashion brand (Heeg et al. 2020; Kelly et al. 2020; Pogatsnik 2018; Woodside 2018; Panitz & Panitz 1998). This research addresses a gap in existing academic research on WIL conceptual frameworks for fashion higher education and offers a promising avenue for integrating WIL into the field both in South Africa and internationally. An industry-endorsed hybrid-curriculum provides a comprehensive learning experience, equipping fashion students with practical skills, critical thinking abilities, and an in-depth understanding of the fashion industry (Stirling et al. 2016).

The integrated approach aligns with the evolving needs of the fashion industry and prepares graduates to thrive in a dynamic and competitive fashion landscape (Leiby & Zhao 2020; Du Preez et al. 2019). By combining multiple learning approaches within a fashion brand context, the WIL conceptual framework develops well-rounded and adaptable skill sets that are relevant to the industry (Du Preez et al. 2019; Leiby & Zhao 2020). Collaboration with an umbrella fashion brand enhances the learning experience, offering insights into current trends and market demands and improving employability prospects for fashion graduates (Stirling et al. 2016; Lubbe et al. 2021).

However, the implementation of an industry-endorsed hybrid-curriculum learning approach requires careful planning, collaboration between academic institutions and industry partners, and adequate

support for faculty members (Lubbe et al. 2021). Future research should focus on the practical application and impact of the proposed conceptual framework in a fashion higher education institution, specifically examining teaching and learning outcomes and the development of graduate attributes through student engagement.

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Creative correspondence: Leveraging design artefacts to generate shared plausible futures

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Abstract

Design anthropologists Gatt and Ingold's concept of *correspondence* describes a designed artefact's ability to appropriately represent a given community's perspectives. For design-researchers operating in co-design contexts, correspondence is helpful for ensuring that final outcomes are 'tuned' to the current and aspirational experiences of user-communities. However, while design-researchers working in practice-led contexts share many concepts and techniques with their design anthropology colleagues, this paper argues that for Design approaches concerned with plausible, anticipatory perspectives, correspondence is a limited concept that can hamper the role of design imagination. In response to this claim, this paper contributes the following outcomes. First, it presents a short theoretical review of the literature that compares design anthropology's critical objective with projective research. Second, the paper outlines key characteristics of correspondence, suggesting its conceptual value and limitations for projective research. This outline is followed by an introductory discussion of Bakhtin's notion of *creative understanding*. The concluding outcome of this comparison is the theorisation of *creative correspondence*, a novel design concept that integrates crucial concepts from correspondence and creative understanding to leverage the unique abilities of design artefacts to generate and ultimately contribute a shared perspective on plausible, preferential futures. Accordingly, the third outcome of the paper is a contextualisation of the relevance of creative correspondence, taking the form of a brief discussion of a community-orientated co-design project involving the author and members of the Westbury community.

Keywords: anticipatory design research, co-design, correspondence, creative understanding.

Introduction

In recent times, numerous design-led research (DLR) methods that evoke futures to inquire into real needs capable of guiding design action have come to the fore. However, one area where there is scarce literature is the integration of participatory and co-design practices into these methods (Lindley et al. 2014, p. 243; Morrison 2018, p. 131). This is a missed opportunity as the design and subsequent implementation of the increasing artificial world must consider the social perspective of the communities that will live with and within them. As Nelson and Stolterman (2012, pp. 21-39) note, design ultimately involves integrating knowledge pertaining to the *true*, the *real* and the *ideal* in an emergent, synergistic, and integrative approach to knowledge generation that extends beyond the sum of its individual approaches. Consequently, these futures-orientated, design-led methods tend to

prioritise the true knowledge of science and/or design imagination but tend to negate the reality of the social world.

Comparatively, a range of non-design fields have begun to include futures-orientated DLR methods in their research practices. While these fields have different disciplinary concerns to the domain of Design, their DLR practices are enriched by sophisticated theoretical concepts that inform participatory engagements. Many of these concepts have the potential to contribute insight into related practices in Design. Importantly, due to epistemological differences, including these 'external' theories requires careful consideration and, if necessary, reconceptualisation to ensure they are fit for design purpose.

This paper introduces the novel concept of *creative correspondence* as a bridging theory connecting design anthropologists Gatt and Ingold's notion of *correspondence* with design theorists McCarthy and Wright's pragmatic framing of *creative understanding*. As will be expanded upon, correspondence originates in the discipline of design anthropology and describes a researcher's ability to successfully reflect the experiences or positionality of a community through design processes and in artefacts. Creative understanding, in turn, originates in the work of Russian literary critic Mikhail Bakhtin, and, through the work of McCarthy and Wright, has become an established theory in the discipline of interaction design.

Initially, the discussion will contextualise futures orientated DLR by briefly reviewing formative and contemporary practices across Design and Design Anthropology. This review is followed by a framing of the fundamental aspects of correspondence and creative understanding, which concludes by outlining the qualities of creative understanding. Lastly, the paper describes the embodiment and implications of creative understanding in a *projective research* provotype,¹ co-designed with community members from Westbury, a neighbourhood on the western outskirts of the Johannesburg city centre.

Literature review

In this paper, I use the term 'design-led research' to refer to research carried out through the medium of design in a manner that closely aligns with research through design (Frayling 1993). DLR encompasses *practice-led* and *practice-based research* (Candy 2006 p. 1), research-focused *discursive design* (Tharp & Tharp 2018), *constructive design research* (Zimmerman et al. 2007; Koskinen et al. 2011), *projective research*, and *design science research* (Hevner et al. 2004).

Futures-orientated design research

While all design is by nature speculative and understood as a form of conjecture that focuses on "how things ought to be" (Simon 1982, p. 4), 'futures-orientated' DLR employs the notion of *futures* – highly complex fictional spaces that are the site for imaginative, yet possible scenarios, which speak of alternative ways of being in the world. In associated design literature, futures cones diagrams are frequently applied to represent how futures can be conceptualised. While representations vary, Dunne and Raby's model (Figure 1) illustrates the fundamental concept of futures cones, demonstrating that the design imagination can occupy a variety of speculative bands arranged in accordance with their conceptual distance from a present state of knowing.

¹ A provotype or research exemplar is an design artefact that communicates a conceptual position rather than the normative design utility of a traditional prototype.

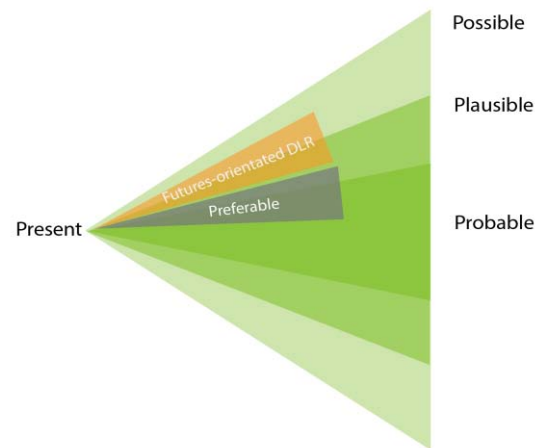


Figure 1: A Futures Cones Model, adapted from Dunne & Raby (2013, p. 3)

The *probable* band of futures cones describes what is likely to occur, barring any significant disruption of norms (Dunne & Raby 2013, p. 3). The *plausible* band (Dunne & Raby 2013, p. 4) is the space of what could happen and is concerned less with predicting the future but rather with exploring alternative visions of the future. The *preferable* band overlaps the probable and plausible spectrums and is typically where 'routine' design operates. The spectrum of *possible* futures (Dunne & Raby 2013, p. 4) describes a type of speculation that sits on the boundaries of what could realistically occur. Typically, possible futures suggest visions of the future that appear dissimilar to our expected continuum but cannot be ruled out as impossible.

In reference to Figure 1, futures-orientated DLR operates across the plausible and possible future spectrums.

While earlier precedents of futures-orientated design exist,² the contemporary 'turn' too speculative futures is seminally associated with the practices of *speculative design* and *design fiction* with its roots in the work produced by staff and students at the Royal College of Arts (UK) in the early 1990s. These practices, collectively referred to as discursive design, focus on using design creativity to communicate ideas and views to generate debate and ultimately change people's views on an issue (Tharp & Tharp 2018, p. 7). Here, speculation is not an attempt to predict an actual future but rather to use design to "open up all sorts of possibilities that can be discussed, debated, and used to collectively define a preferable future" (Tharp & Tharp 2013, p. 69). In particular, speculative design is concerned with presenting compelling accounts of "alternatives to existing social structures and institutions of power and privilege" to disrupt the limitations of the future as currently presented to us (Dunne & Raby 2013, p. 161).

Design fiction overlaps with many aspects of speculative design (Dunne & Raby 2013, p. 100; Tharp & Tharp 2018, p. 87). The primary difference is that while in speculative design practice, produced artefacts typically act as 'imagination' portals into inferred or partially revealed worlds, in design fiction 'story-worlds' become the primary narrative device. In this manner, design fiction can be described as designing "with stories, or within the world of a story" to create "believable and relatable" fictions, which "first represent and then explore the nuances and 'mundanity' of future circumstances" (Lindley et al. 2014, p. 241).

² Such as the Archigram movement in architecture (Koskinen et al. 2011, p. 90),

In terms of research, speculative design and design fiction practices most often operate in the mode of social engagement (Tharp & Tharp 2018, p. 124), aiming to communicate typically highly subjective, practitioner-driven discourse to broader society, disseminating work through exhibitions, public performances, and the internet. Due to inherently subjective positionings, as evident across Tharp and Tharp (2018, p. 126-131), discursive design DLR practices are currently immature regarding theory, method, and rigour.

More recently, a range of practices, including projective research (Geldof & Janssens 2014; Figueiredo 2020), *anticipatory design research* (Morrison 2018), and *metrofitting* (Fry 2019) have emerged that collectively employ research practices that utilise design fictions to rigorously inquire into "putative and contingent" future states to "reach for tomorrow's worlds today" (Morrison 2018, p. 125).^{3,4} The central tenet of projective research is the notion of anticipation, which relates to concepts of "preparation, expectation and valuing something probable" (De Smet & Janssens 2016, p. 2762). Further, projective research is typically applied in the context of systemic changes (economic, environmental, social) in order not only to "learn from the future" but also to recognise "important points of attention" and reflect on "directions for change" (Geldof & Janssens 2014, p. 8).

In this manner, the futures-orientated speculations of projective research are presented in long-term artefactual scenarios termed provotypes that project a situation and the events that led to the situation occurring. Importantly, unlike typical discursive design practices, in projective research, the development of provotypes is informed by 'facts and data' (De Smet & Janssens 2016, p. 2763). Communicated scenarios, thus, are informed by rigorous research practices while operationalising the imaginative impact of design fictions to identify and explore the implications of plausible futures and, in doing so, "allowing designers and their designs to match the velocity of the future before critical impacts occur" (Lindley et al. 2015, p. 58).

Problematically, literature related to projective research is limited, presumably because it is an emergent area of practice. Consequently, as with speculative design and design fiction, projective research is theoretically and methodologically vague (Lindley et al. 2014, p. 243).

Design anthropology

In comparison, the discipline of design anthropology presents a range of theories that inform how communities can contribute meaningfully to the design of provotypes. Design anthropology integrates elements from both Anthropology and Design but is best understood as a unique transdisciplinary knowledge domain with its own research practices (Anastassakis & Szaniecki 2016, pp. 121, 124). Rather than applying the traditional objective observer stance of conventional ethnographic research, practitioners of design anthropology intervene in the world, utilising acts of design to "follow dynamic situations and social relations" to explore how people "perceive, create, and transform their environments through their everyday activities" (Gunn et al. 2020).

In design anthropology, the interpretation of practices that lead to the creation of the artefact or the artefacts themselves are the primary knowledge constructs of the field. In this manner, provotypes are containers of anthropological knowledge theories akin to any other phenomenological construct of meaning, such as, for example, the notion of 'Gifting' or 'Trust' or 'Race'. These provotypes-as-constructs-of-meaning are considered anthropological devices to be further described, interpreted,

3 Design fictions refers to any use of design artefacts for fictional purposes. Design fiction denotes the discursive design approach.

4 In the remainder of this paper, I use projective research to collectively refer to all these practices.

debated and theorised. Consequently, design anthropology utilises DLR to generate knowledge relevant to anthropology and rarely directly contributes knowledge to inform Design (DiSalvo 2016, p. 151). Therefore, design anthropology is a highly theoretical practice that is not only highly informed by anthropological theory but also has the intention to generate it as its primary goal.

Theoretical background

Correspondence

Correspondence (Gatt & Ingold 2013, pp. 142-144) is a central conceptual consideration of design anthropology that has value for design research and practice. Correspondence refers to the notion of "being in accordance with the flow of events, to moving forward with people in the pursuit of their dreams and aspirations rather than dwelling on their past" (Otto & Smith 2020, p. 17). As represented in Figure 2, in design anthropology, correspondence denotes the quality of a provotype (as a researcher's construct of meaning) to result from an accordance between the design researcher and participants in which both sets of actors listen and respond to each other. In a literal sense, this refers to the ability of provotype to infer the experiences of a community regarding a particular situation, event, activity, or engagement.

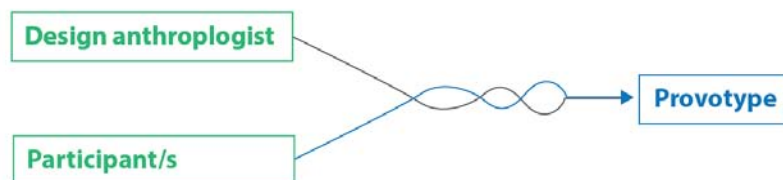


Figure 2: A representation of the relationships involved in correspondence

Creative understanding

McCarthy and Wright (2004, p. 18) suggest that for Bakhtin, meaning emerges through a dialogic engagement between the embodied self and the exterior world. This dialogical engagement, which Bakhtin refers to as *creative understanding*, explains people's experience of the world as emerging through a tension between the self and an 'other'. Be that other, another person, living creature, or entity.

For Bakhtin, experience, which in this context equates to sensemaking coloured by emotion, reflection, space, and time, always involves a person perceiving an object, a text, or a person as something actively fashioned into a whole (McCarthy & Wright 2004, p. 73). This 'wholeness' of the meaning of the other is never inherent nor final and is only completed by the individual's perception of it. In this manner, the experiencer provides the final allocation of meaning to the other. This 'authorship' of meaning is unique to and reliant on the individual's sense of the other.

Thus, meaning is fluid, always in the process of construction and emergence, and generated in relationships occurring in contexts of place and time.

What is essential about creative understanding is that it positions understanding as evolving from the engaged 'discussion' of two parties that individually bring subjective, unpredictable views and responses. The consequence of discussing and trading views is a general progression towards understanding. Creative understanding is thus a synthetic act; it requires a coming together of the self

and the other to achieve a shared new perspective. Furthermore, McCarthy and Wright (2004, pp. 18, 68) suggest that creative understanding is key to overcoming current states by either imagining new ways of acting or through the reframing of descriptions of situations rather than in accordance with any explicit high-level goal orientation.

Creative correspondence

For projective research work intending to build projections based on ethnographic qualitative data, correspondence offers a theoretically rich approach for answering to a community's sense of a situation. However, from a Design perspective, a focus on the experience of others has its creative limits. In this sense, and returning to Nelson and Stolterman, correspondence emphasises the *real*, negating its full design synthesis with the *true* and the *ideal*. In anthropology, this is an irrelevant concern as the entire point is to remain bound to the 'real' of the other. However, this does not go far enough for DLR methods that have the mandate to evoke futures to guide inquiry about the nature and repercussions of potential design strategies.

In contrast, creative understanding recognises that new understanding capable of overcoming current states is always emergent in the coming together of differing perspectives. In this manner, creative understanding articulates a role for *design proposition* and *interpretation*. Here, design proposition is equated with the designer's practised and informed abilities to imaginatively synthesise the true, real, and ideal in a manner that extends beyond correspondence to offer glimpses of what could be. Design interpretation refers to the ability of a literate design audience to 'reverse design' a proposed design solution, revealing an approximate framing of the causal problem, of which there may be other equally compelling solutions.

Drawing on these notions and as illustrated in Figure 2, creative correspondence builds on the ethnographic 'accordance' qualities of correspondence to articulate two orders of integrated creative acts that have a particular 'designerly' nature. The first order extends a community's sense of a situation with the specialist abilities of design-researchers to bring new understanding, expert knowledge, and training to transform a situation. In this sense, the design-researchers 'complete' their understanding of the participants' experiences through their design synthesis based on their expertise and prior experiences. Comparatively, the second order of creative correspondence pertains to the interpretation and 'authoring of meaning' of the design-researcher's first order of creative correspondence by a design audience. This act occurs through the design audience recognition of the design researchers' provotype as a fictional proposition that while communicating valid research findings, is purposefully open to critical reframing.

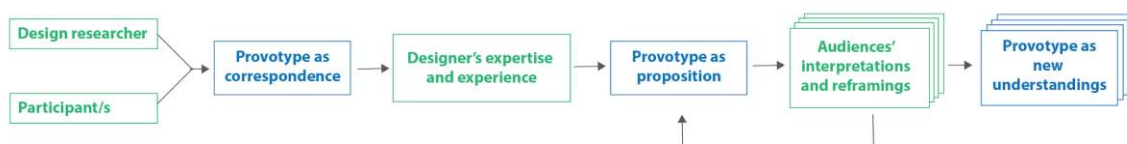


Figure 3: A representation of the relationships involved in creative correspondence

Method

In the remainder of this paper, the focus shifts to discuss how creative correspondence is exemplified in a projective research provotype generated by the author in response to insights from a series of co-design workshops. These four workshops involved 26 participants from the Westbury community and took place between April and June 2022. The encompassing project comprising the workshops and

the provotype design formed the 'relevance' phase of my more extensive *Design Ethnography* doctoral study. This conceptualisation of creative correspondence emerged from reflections on the design of the provotype and related evaluative feedback sessions involving community participants and design experts.

The Westbury 2052 provotype

Westbury 2022

Westbury is an economically deprived suburb of predominantly Afrikaans-speaking Coloured residents. The suburb has approximately 13,500 residents occupying 1.03 km² (Klug 2016, p. 14), 7 km northwest of the central business district of Johannesburg. While Westbury contains multiple parks, sports fields, a library, a large community hall, and a youth recreational centre, residential housing comprises densely populated, structurally neglected blocks of flats and small bungalow houses, while much of the open land is characterised by urban degradation and uncollected rubbish. Several problematic social factors characterise Westbury. Foremost is its long history of criminal and gang-related activities (Klug 2016, p. 58). Like many communities in South Africa, Westbury is also affected by high unemployment, particularly amongst its youth, and there is a strong distrust of government initiatives (Klug 2016, p. v).

The Westbury 2072 project

Westbury 2072 describes a series of co-design activities and outcomes that took place during workshops with groups of neighbourhood residents, forming a representative sample of the broader community of Westbury. The intention of the activities was to generate correspondence with these participants in terms of their shared heritage, the current experiences of their neighbourhood environment, and critically, their preferred future experiences for their neighbourhood spaces in the contexts of the value that they perceived digital technologies blended into the urban infrastructure (or smart urban places) could bring to the Westbury community.

The inquiry into the past took the form of a visual narrative, informed by secondary research, presented to participants. Participants were given the opportunity to add to or amend the presented timeline.

Inquiry into the present state of the neighbourhood environment involved each participant generating a collage from provided magazines that represented their experience. Each participant presented their collage to the group and described their intended meaning.

Inquiry into the future state involved, first, a presentation of a future timeline indicating a series of fictional occurrences taking place between 2022 and 2062. Necessary to this future scenario was the inclusion of aspects that articulated the technological nature of smart urban places. While much of the rest of the scenario was purposely fictional, bordering on the possible, the technological aspects occupied a more probable timing. Once the future scenario had been presented, participants were tasked, in groups, with responding to it by imagining that the date was 2062 and that they had to design a smart urban place, implemented on a specific land site, that would benefit the community most. Group designs took the form of cardboard models augmented by collaged and drawn elements. Once each group had completed their models, they verbally described the model elements and implications.

The oral descriptions from the collage and the future models were recorded, transcribed, and qualitatively analysed. Six key insights emerged regarding the community's aspirations for their future smart urban places. These are summarised in the design schemas presented in Table 1.

Table 1: An analysis of the data suggested the community aspired for

Design schema 1:	Smart urban places that are safe.
Design schema 2:	Smart urban places cultural immersion.
Design schema 3:	Smart urban places creative production.
Design schema 4:	Street as place.
Design schema 5:	Smart urban places for well-being.
Design schema 6:	Smart urban places central services.

The Westbury 2052 provotype

The second phase of the encompassing project involved the design of the *Westbury 2052* projective research provotype. Two primary criteria guided the design. The first required that the provotype corresponded with the aspirations of the community. The second required that the provotype was impactful on a design audience characteristic of practitioners and academics likely to be involved in shaping and implementing smart urban environments in the near to mid-term. To these ends, the provotype design required that I integrate the wide range of ideas put forward by participants with a more precise, theory-driven accounts of smart technologies and urban placemaking while ensuring the primary ethnographic concerns that emerged from the co-design activities are identifiable.

As depicted in (Figures 4-7), the final provotype took the form of a double-sided leporello booklet (1200mm x 220mm). On one side is a fictional streetscape that illustrates a ‘high-street’ precinct in Westbury, circa 2052. The illustrated high street emphasises the deployment of a system of smart technologies within the urban sphere, highlighting social and technologically mediated activities. On the reverse side is a textual accompaniment that adds a deeper level of explanation as to the technical logic of the smart entities and places. The research report narrative is fictitious but suggests an interpretation of the six schemas presented in Table 1. The text is formal, reminiscent of a research report and accompanied by technical diagrams.



Figure 4: Westbury 2052 streetscape, left-to-centre section

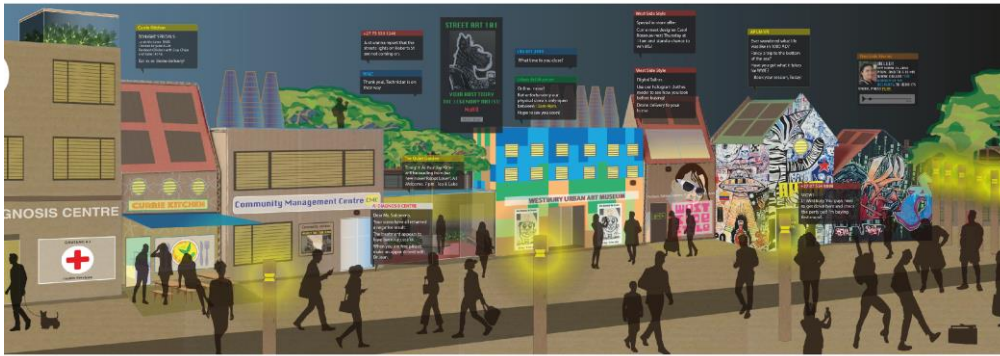


Figure 5: Westbury 2052 streetscape, centre-to-right section



Figure 6: Westbury 2052 'research report', left-to-centre section



Figure 7: Westbury 2052 'research report', centre-to-right section

Upon completion, the provotype was presented to a representative sample of community members that had participated in the workshops and then to six design 'experts' for evaluation. The array of design experts included academics and practitioners involved in smart urban design, urban design or digital ecosystems design.

Discussion

Detailing the correspondence of the provotype

In the Westbury 2052 project, correspondence between the provotype and the neighbourhood community was equated with 'answering' to a community's sense and significance of their preferred smart urban environments. This occurrence was established in feedback session during which participants first critiqued and verified each design schema, and then followed the same process regarding a printed prototype of the leporello provotype. While there were some minor alterations suggested, overall, the Westbury 2052 provotype was received positively by the group, as exemplified below:

And when I looked at this picture, this was Westbury in our days. In my days, it brings back some really beautiful memories, because we had all this before the chaos started before you know, the storm started. We could walk anytime in the street. We had the parks [...] we had all these things [...] There used to be all these things in my days [...] If I look at Westbury now, and Westbury then. This is what I want to see (Bernadine Naude).⁵

In summary, participants' feedback and amendment suggestions ensured significant correspondence across both sets of relationships.

Detailing the creative correspondence of the provotype

As noted in Section 3, creative correspondence operates across two orders detailing the design synthesis employed by the design-research and the interpretive reframing of the design-researchers proposition, as embodied in the provotype, by the design audience.

In terms of first-order creative correspondence, correspondence in the design anthropology sense forms a necessary foundation, which is then extended through the designer's imaginative synthesis of the true, real, and ideal to propose a sense and implication of transformative states. At the broadest level of detail, in the Westbury 2052 provotype this creative synthesis involved the following principal elements. The *real* related to the current and historical experiences of the community participants. The *true* reflected disciplinary knowledge regarding smart technology and urban design. Lastly, the *ideal* was contrived from ideas generated from community participants, concepts found in secondary sources, and various ideas that I have had, or encountered in student projects while teaching 'smart' themed design courses over the last decade.

While these elements suggest the conceptual heritage of the provotype, it is my (as the design-researcher) subjective synthesis of the elements in the placemaking of the Westbury 2052 provotype that is critical. In this sense, the design proposition I present describes a future, ideal state and how it came to be, and brings a value that is significantly different to routine correspondence. In this manner, as evident in Figures 4-7, the Westbury 2052 provotype sets up two key aspects of creative correspondence in futures-orientated DLR. These aspects are, in turn, a future scenario that, while potentially plausible, is fundamentally fictional and a considered effort to systemically 'design' the future scenario into being in an ideal, yet plausible state.

These two fundamental requirements of projective research allow for a particular designerly understanding of second-order creative correspondence to take place.

⁵ Pseudonyms are used in all verbatim quotes.

Consequently, the provotype's discourse is communicated to its design audience with the specific intention of provoking new ideas and ways of working. Situating the provotype in a recognisable, fictional future ensures that the communication is not intended to predict design concepts directly applicable in current practice. Instead, the recognisable aim is that expert designers would conceptually juxtapose the content of the provotype with their understanding and ideas for real-world design contexts and, ultimately, generate a third way of approaching similar design contexts, one that integrates aspects of their prior knowledge with new ways of thinking, generated through engaging with the provotype.

In responses provided by the various design experts, these qualities are evident in the Westbury 2052 provotype.

First, all five experts identified the provotype as the representation of a fictional futures. More specifically, they identified the presented fiction as plausible and, as such, potentially achievable. For example, as indicated in the quote below, the presented future was not interpreted as predictive or purely imaginative.

And my immediate thought, as I was reading through the following, the defining thing was 'possibility'. That was the word that came to my mind when I got to the end, and I started reading the text – the idea that this is a possible future that is completely available if a number of things happen (Prof Gio Rimini).

Second, experts recognised that the provotype was not attempting to communicate literal and implementable design product concepts, but rather was discursive: generating discourse, raising issues, stimulating, and guiding thinking, and challenging assumptions. For example:

I understood it, it's not an architectural [representation], it's just the conceptual idea through which we can begin to think about technology (Andrew Mayer).

It's your experience of the fiction that makes it so compelling. It's getting lost in it. That bottom level of detail is so important [...] Because getting lost in it is when I can start to take ownership of what I see in it (Blake Calvin).

Third, and in relation to the previous point, the conceptual openness of the provotype was noted. In this manner, it was evident that the design storytelling provided a rich exemplification of how the six design schemas that reflected a rigorous analysis of the communities' expectations could manifest. Crucially, however, it was understood that these schemas could be applied in numerous, different ways.

It's a very focused, very stimulating fresh view on, which makes people rethink their assumptions about what they do, as designers in relation to a city (Blake Calvin)

This aspect was particularly striking in how, for example, Design Schema 1: *Smart urban places that are safe* was communicated in the provotype. In the workshops, participants were adamant that the best use of smart technology in Westbury would be a neighbourhood-wide smart camera surveillance network. This concept raised concerns about privacy and control, but participants insisted they were happy to give up their civil liberties for a safer neighbourhood. Consequently, I decided to include the camera network in the provotype, as they had described it. In the following quote, one can see how this 'bad' urban design forces one of the expert reviewers to consider what a more appropriate solution would be:

I predicted. I predicted in terms of the concepts that are there, I think there was some mention about [...] community policing or something like that. And critiquing it and say, but in spatial terms, what would that be? And this one doesn't do that [provide an effective solution] really,

very well. But it raises suggestions about it, but then I would have to develop it as an architect to say what that would mean (Dr Edward Ndeboni).

Ultimately, these discursive engagements, between design-researcher and the elements of the true, real, and ideal, and between the provotype and its design audiences, require each party to bring their own understanding to the conversation with a final intention of reaching a new understanding through a sharing of diverse perspectives by individuals.

Conclusion

Creative correspondence is a helpful concept for informing and describing the fundamental goals of a set of emerging DLR practices that, in this study, have been described under the broad category of projective research. These practices have the potential to allow design-researchers to anticipate and communicate a sense of our emerging technological futures and ultimately generate awareness about the impact of these technologies and how they could best be deployed (if at all). In this study, creative correspondence is introduced and exemplified as an underpinning theory for projective research concerned with reflecting communities' desires for their futures. This is of value as few theoretical explanations characterise projective research. Providing a considered theoretical framework can contribute to the growing application of projective research in postgraduate and professional design research. Future work could potentially look at other design anthropology concepts to establish if they could offer any further relevance to projective research. Alternatively, as creative correspondence was conceptualised inductively from the Westbury 2072 and 2052 projects, it would be interesting to evaluate its effectiveness as a guiding theory for other projective research studies.

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Using SLOC as a co-design inquiry tool into nomadic pedagogy for a Design+Ecology project

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Abstract

Design educators have been trying for the past decades to frame real-world problems in the context of studio-based practices through the lens of economic design logic as the status quo. Such studio-based design pedagogy distances students from real-world problems, leading to poor problem definition resulting from poor understanding and not experiencing the problem firsthand. In order to counter such a conservative design problem-solving approach some design educators have adopted nomadic pedagogy, which promotes curious-emphatic design approach that embraces performative enactment to generate solutions based on a well-defined problem. Though nomadic pedagogy has promising possibilities for design education aimed at exposing students to real-world problems to equip them to empathise in developing contextually responsive solutions, its contours in terms of co-designing are not well defined, making inquiry into the approach difficult. The cardinal aim of this research is, therefore, to attempt to use SLOC (small, local open, and connected), a collaborative framework as a co-design inquiry tool into nomadic pedagogy using a case of a Design+Ecology project in Cape Town, South Africa. Methodologically, the study adopted narrative approaches because the researchers wanted to get data on how the participants co-experienced the nomadic pedagogy and its influence on them during the 'co-problematisation' and co-solution development. The study employed a case study and used document review to study the entire co-designing process. Informal interviews through conversations were also used to gather data from some of the participants, which included lecturers, stakeholders, and students, on their experiences through the lens of 'SLOC' (small, open, local, and connected). SLOC was also used as the research framework and analysis tool. The results showed that in the small context, the participants engaged in collaborative narratives and co-conceptualisation for better problem co-definitions focusing on a small unit of the problem. The nomadic pedagogy positioned participants to co-engage in local, open, and connected facets of SLOC, through leveraging inspirations from global design online platforms and the application of the biomimicry method, which allowed for unrestrained doing and becoming, influenced by the fluidity of learning generated by place and space, thereby producing a true relational ontology for the participants.

Keywords: Biomimicry, design+ecology, nomadic pedagogy, SLOC.

Introduction

Design educators have been trying for the past decades to frame real-world problems into the context of studio-based practices through the lens of economically driven industrial demands that represent the status quo. Such studio-based design pedagogy positions students to create solutions through a linear path driven by capitalism for economic growth. In such a situation, the space and place of students' interaction and intra-actions are constant and students have to go through the challenges of envisioning the real world through a narrow design approach. Thus, framed problems are engaged with by students as an academic activity that distances students from the problem and make them solution inclined with poor problem definition. Hence, the resulting creativity by students lack the agency and forward thinking based on their restrained and narrowed frame of reference for solutions, which do not solve societal problems but rather lead to economic or industrial growth with its attendant environmental challenges and social inequalities (Bonsu, Chisin & Cronje 2022).

Brassett and Marenko (2015) further argue that such conservative intrinsic and entrenched design problem-solving approaches should transit into a curious-emphatic design approach informed by problem identification. Such a shift therefore, needs agency to be initiated through a performative enactment approach where roles are given to students to enact them for an immersive understanding of a phenomenon. Performative enactment can be tied to the concept of nomadic pedagogy, which thrives on ontological enactment for learning (Snaddon & Chisin 2017). The essence of the nomadic pedagogy is to position students in an inventive, responsive, and fluid space and place to engage discursively and performatively as they problematise the unsustainability phenomenon to generate 'good' solutions. Framed in this way, sustainability is built on the concept of flourishing, meaning sustainability for societal well-being is the focus and not industrial well-being. The shift of the lens for defining problems and creating solutions that are not based on capitalism is driven by the fact that capitalism is tied to economic expansion that benefits the minority. This expansion drives consumerism that is causing the earth to overshoot its planetary boundaries, which has led to ecological breakdown, ocean acidification and biodiversity collapse just to mention a few (Lenton et al. 2020). This implies that designers engaged in industrially focused design practices boost the capitalist project, creating never-ending iterations of destruction based on consumers' insatiable desire for Earth's scarce resources. Currently, a lot of progress has been made to shift from the capitalist or market design logic to community design logic that promotes nomadic pedagogy. However, nomadic pedagogy poses inquiry challenges especially from a co-design perspective; hence how people experience nomadism is less inquired into, thus, this paper attempted the use of SLOC (Small, local, open and connected), a collaborative framework as a co-design inquiry tool into the nomadic pedagogy, which was used for a Design+Ecology project that employed biomimicry as a means to develop design proposals for Swellendam, a community in Cape Town, South Africa. The paper's focus is not on the biomimicry aspect but on how the students co-engaged in co-designing their biomimicry solutions. Biomimicry refers to studying nature's designs and then imitating these designs and processes to solve human problems (Kennedy 2004).

Nomadic pedagogy

The shift to nomadic pedagogy intends to expose students to the ideology that the cardinal aim of designers is to improve people's existing situations and not to worsen it (Frascara 2017). Nomadic pedagogy positions design as an accountability profession that should engage projects important to society (Frascara 2017), which are less harmful to the environment from a sustainability perspective. Frascara (2017), therefore, supports the ideology that design education has to change to reach its full potential in promoting societal well-being through an interdisciplinary and socially responsible

activity. In this context, nomadic pedagogy positions students in an enabling environment where learning happens through experience, inquiry, and reflection in the space of collective and collaborative real-world experimentation in design (Sterling 2009). Thus, it positions students to engage in diffraction, which is based on a relational ontology, an ongoing process in which matter and meaning are co-constructed. Though nomadic pedagogy offers promising possibilities in design education for exposing students to real-world problems that help them empathise to develop socially responsive solutions, its contours are not well defined making inquiry into the pedagogy difficult. The cardinal aim of this research is, therefore, to attempt to use SLOC (small, local, open and connected) as a design inquiry tool for nomadic pedagogy to define its contours using the case of a Design+Ecology project in Cape Town. SLOC (Manzini 2010) was adopted because it resonates with local and unconventional approaches to innovations that are relevant and generated by society for society to advance sustainable living.

What form does nomadic design pedagogy take and how can it be probed? Nomadic pedagogy or education permits individuals to express themselves freely with the understanding that opposing views are valid from a constructive perspective (Drakers 2022). Furthermore, nomadic pedagogy allows students room for 'being' through the process of becoming (Sidebottom 2019); implying that becoming is not structured based on declarative pedagogical schemes but is based on the individual's interaction with the environment and the things within, which enriches experiences of knowing and the subsequent becoming (Drakers 2022). Nomadic pedagogy, therefore, creates an environment that enables participants in a learning space to make decisions in doing or when engaged in a practical activity driven by what they are continually becoming based on how they experience and interpret events around them from a personal or collective perspective. Fendler (2013) also attempts to clarify the definition of nomadic pedagogy by reframing it as a learning approach that exposes learners to new encounters due to unfamiliar spaces they subject themselves to in their quest for discovery.

Deleuze and Guattari (2004) posit that nomadic practices are ideas and demonstrations that counter entrenched positions and phenomena. Nomadic practices are based on an approach that does not subvert, but rather elicits and accepts that there are other ways of experiencing the world without undermining other structured ways or rejecting them as a means of learning (Drakers 2022). This implies that learning is a summative way of knowing and becoming, therefore every experience encountered plays a major role in the becoming of a learner. Nomadic pedagogy can therefore, be framed in this research as a an experiential learning approach that exposes students to out-of-class encounters that hold the potential to trigger deeper appreciations that enlighten learners worldviews and inform how they define problems and solve them.

The contours of nomadic pedagogy and the related issues

Nomadic pedagogy is open and therefore, demands delineation should one need to assess it. It deviates from structured approaches that filter a learner's experiences that denies a learner from a holistic encounter with the world and predetermines a learner's path and what a learner becomes. Nomadic pedagogy, therefore, does not have contours on how a learner encounters the world. How then, can nomadic pedagogy lead to a productive outcome in a design-inclined project through co-designing? Shi (2022) gives an exposition on the characteristics of nomadic pedagogy as an attempt to contour it through power relations, resistance to conventions, reflections on ethnicity and a quest for new modes of existence but in a context of individualistic experiences. Shi (2022) further adds that these facets are principles for nomadic approaches and are used within the context of mapping, cartography, ethnography, and place making, which are tagged as methods for nomadicity. These do

not point out how the facets occur nor the environments that trigger these prescribed nomadic methods. Where then, does the enquiry into such pedagogy start and end especially in the context of co-design? Boynton and Russell (1999) responded to the questions asked by elucidating that nomadicity is overwhelming and looks complex in practice, however, it can be made easier through the sharing of experiences and guidebooks.

This paper argues that to assess nomadic pedagogy, the concept of nomadicity can be tagged as an exploratory phase in a design-led project or research and thus there is still a need to introduce a guiding concept to experience phenomena. However, how the learner experiences the given phenomena is hinged on or subject to the explorative-self of the learner. In this paper, we suggest that a possible way to conduct inquiry into nomadic pedagogy is through using SLOC in the context of co-design. It seeks to understand what happens when a group of students is dropped into an immersive experience outside of their linear-learning path.

SLOC as a co-design inquiry tool into nomadic pedagogy

How can SLOC be used as a co-design inquiry tool for a better understanding of nomadic pedagogy? SLOC is positioned as the framework for this research because Manzini (2010) frames it as an emerging scenario that promotes [doing] outside mainstream models that advances distributed production from a socio-technical perspective. Socio-technical system refers to the use of technology by society for providing solutions in manageable small units by different people at different places, which play different supporting roles in society. Since the produced solutions are at different places within the community, they create a network structure, which shows distributed solutions termed as distributed productions. SLOC, which means Small, Local, Open and connected promotes sustainable solutions from local stands and facilitates democratic participation in manageable small units or quantities (Manzini 2010). The Local and Small are tagged as attributes of the emerging scenarios, which are made functional through being open and connected to have global significance. The open and connected dimensions of SLOC, therefore, drive creative participation of people or actors in social innovations, which in other words serve as co-design capitals.

Co-design is a design method for co-probing shared problems for better understanding to co-generate viable solutions through the active involvement of designers and diverse range of participants with lived experiences (Blomkamp 2018; Whicher & Crick 2019). Co-design is known as collaborative design and has its roots in Scandinavian participatory design (Burkett 2012, p. 6; Torjman 2012, p. 19). Co-design is therefore recognised as a potent means to develop an inclusive solution to challenges within [many disciplines] especially in service design for both public and private organisations and also in product design (Sanders 2014; Farr 2013; Kimbell 2015). Co-design is mostly done from three major design perspectives, which are professional, market and community perspectives (Sangiorgi et al. 2022). When co-design adopts professional logic, it might not factor lived experiences or contributions in the final design output (Willis 2018; Sangiorgi et al. 2022). On the other hand, if co-design follows market logic, efficiency and profitability drive the design outcome (Farr 2019; Kimbell & Bailey 2017; Sangiorgi et al. 2022), but may lack insight from minorities with their attached local needs. However, co-design that factors community logic meets local needs but weakens professional input due to its liberal approach (Akama & Yee 2019; Escobar 2018; Sangiorgi et al. 2022). Nomadic pedagogy, in the context of SLOC and co-design attempts to overcome the inherent challenge of community-based co-design by moving professionals or students into the local space for local experience but still problematising and providing solutions with a professional mindset.

Based on the expositions towards aligning SLOC with co-design as a tool of inquiry for nomadic pedagogy, SLOC creates the means for the co-design stages to manifest as rendered in Figure 1. Thus, creating a space with attributes for nomadic pedagogy for students' out-of-class experiences for (re)definition of their worldviews and problems for valid solutions.

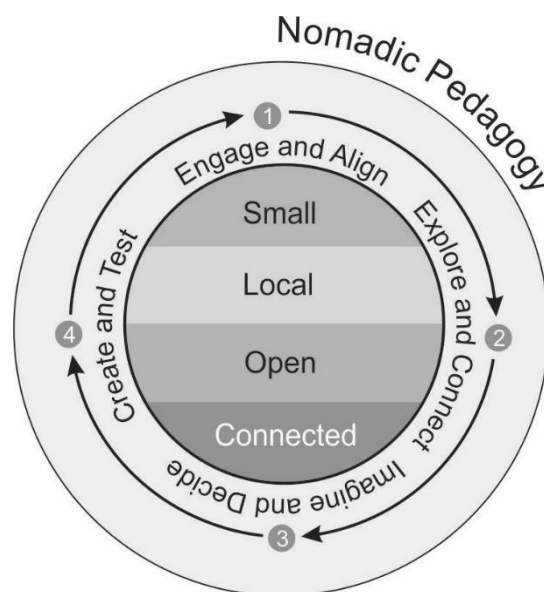


Figure 1: SLOC as co-design inquiry tool into nomadic pedagogy (developed by authors)

The research method

The study adopted qualitative approaches because the researchers wanted to get data on how the participants co-experienced the immersion (nomadic pedagogy) and its influence on them during the 'co-problematisation' and co-solution development. The study employed a case study and used document review to study the entire co-designing process used for the Design+Ecology project, which employed biomimicry as an approach to designing waste solutions for a community. Ethical and privacy concerns were addressed by getting consent from the participants in the case study. Informal interviews through conversations were also used to gather data on their experiences from some of the participants, which included lecturers, stakeholders, and students. SLOC was also used as the research framework and analysis tool. The obtained data, which covered the entire nomadic process was presented from co-design perspective and assessed through the lens of SLOC. The data gathered were from five groups of participants, which covered their immersion, exploration, connection, and ideation. The five groups were assigned to immerse themselves in how these companies namely Community Action Partnership, Swellendam Hospital, Southern Oil, VRT Pitt Primary School and Grace+Merci Restaurant produce and manage their solid waste in the Swellendam municipality.

The nomadic pedagogy positioned participants to co-engage in local, open, and connected facets of SLOC, through using the co-design stages, which positioned students to gain inspiration from global space through online design platforms for the application of the biomimicry method. The approach allowed for unrestrained doing and becoming and was influenced by the fluidity of learning generated by place and space, thereby producing a true relational ontology for the participants. This form of learning space in the lens of SLOC provided levity to enable students to generate self-actualisation regarding the agency for co-designing solutions for solid waste reduction through empathetic experiences that were made tangible through reflections and refractions.

Findings and discussions

The results of the nomadic pedagogy immersion through the lens of SLOC reveal how students from one University of Technology in Cape Town engaged in an existing real-world design challenge that used biomimicry as a lens to design alternative ways to manage organic waste in Swellendam in the Western Cape. The immersion exposed students to an in-depth learning encounter with new environments and challenges that held the potential to change their design perspectives. The challenge focused on the need to reduce and manage waste through the journey in co-creation of biomimicry-inspired proposals. The focus of the research is not in the biomimicry-inspired proposals but to make an inquiry into how the students co-designed their proposals using SLOC as the lens. The students were put into five groups consisting of two individuals each to design their proposals based on the waste management challenges that they were given, which were linked to the solid waste produced by the institution, which was Community Action Partnership, Swellendam Hospital, Southern Oil, VRT Pitt Primary School and Grace+Merci Restaurant in the Swellendam municipality. The subsequent sub-topics throw more light on the immersive encounters of the students based on the research findings, which gives insight into how the students engaged in the creation of biomimicry design proposals.

Students' immersive encounters in the context of nomadcity through the lens of SLOC

The students participating in the Design+Ecology project were transported to a small town and accommodated on a guest farm. This was done to facilitate a deep immersive encounter with nature, to learn from nature through biomimetic methods and to break away from studio-based learning. The exposure positioned them to experience a relational ontology that broadened their frame of reference and connected them to the environment to problematise the waste challenges within the Swellendam municipality. During the first phase of the immersion, ecology experts gave the students an orientation presentation. This was required since the students came in with a particular design mindset and needed to expand their frame of reference with new knowledge on design and ecology (and waste production/management problems), since that was the problematic area the students had to design proposals for. Lecturers provided students with a Biomimicry design guidebook titled *We are Earth*, which guided them to experience anew the interconnectedness between humans and nature, and how design can employ biomimicry to develop solutions by studying natural champions and learning from them.



Figure 2: Orientations on Design+Ecology project

During the immersion week, the students were put into five groups and assigned with tasks, namely to engage with the five institutions to ‘problematise’ their solid waste challenges as the core task. From a nomadic pedagogy perspective, they were directed to visit the institutions they were assigned to in person and to co-engage with the stakeholders by observing and interviewing them regarding the solid waste generated and how the solid waste was managed. The observations and interviews were also done holistically but after the immersion, the identified challenges were broken down into units to make the ‘problematism’ simple in the context of solid waste challenges as captured in Figure 3.

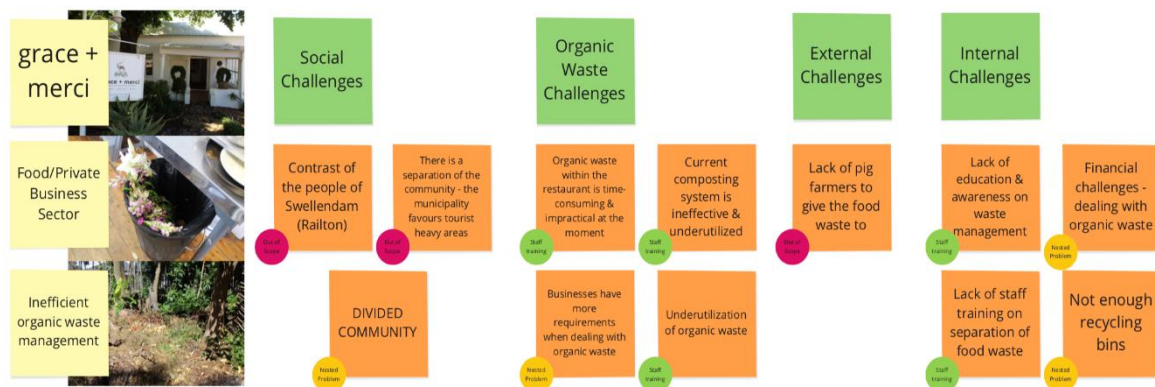


Figure 3: Broken down challenges for easy ‘problematism’

Making inquiry into the immersion stage (engage and align) of the nomadic pedagogy through the lens of SLOC

The immersion encounter shows that nomadic pedagogy, though “open”, as Boynton and Russell (1999) put it, can be steered through the sharing of experiences and guidebooks or field books. From the perspective of SLOC, it can be deduced that the initial facilitation by the lecturers or instructors in the pursuit of nomadic pedagogy, was to give the participating students an out-of-class exposure to the environment of the project, representing the *Local* dimension of SLOC for personal encounters and opening up insights to shape, or re-shape worldviews. Regarding the *Open* dimension of SLOC, students had to trust each other and be open to new ways of encountering and experiencing their surroundings. Students worked in pairs and blindfolded each other in turn. This exposure to the natural environment, with their sense of sight cancelled, enabled their other senses, such as touch, smell, taste, and hearing, to take centre stage. One partner would choose a natural object and offer it to the blindfolded to identify and describe. The need for trust and openness to immerse oneself in the phenomenon was crucial in the process.

The other *Open* dimension manifested in the reception of the students to the guidelines provided to them on how to proceed with the project from a design and ecological perspective, using biomimicry as the method. The openness in students’ attitudes was central in forging connections with natural phenomena, underpinning their levels of engagement during different encounters and the meanings they associated them. Openness was also central in the ‘co-problematism’ because the participants shared their individual experiences, which led to cross-pollination of experiences and a deeper understanding of what was experienced by individual participants. The co-sharing of experiences helped peers in the group deepen their collaborations and indicated that the *Open* facet of SLOC leads to the *connected* facet. The outcome of the ‘co-problematism’ was an identification of the different components of the various waste management challenges (as shown in Figures 2-3). This

corresponded with the perception of challenges from an immersive, nomadic viewpoint, in smaller units for an engaged encounter and contextualised solutions manifesting the concept of *Small* in SLOC. This forms an iterative cycle in SLOC.

Exploration, connecting and ideation in the context of nomadic pedagogy

After the co-immersion and ‘co-problematisation’, the next stage of the project was the co-exploration, co-connecting, and co-ideation to develop conceptual proposals for solid waste management challenges for the Swellendam Municipality. The co-exploration was done through the use of an online, open-access tool named AskNATURE. Each group consisting of two students co-explored by discussing what to search for before entering it into the online tool for suggestions on how to approach the identified challenge from a biomimetic perspective. Each group harvested several solutions from nature on how to co-design their conceptual proposal based on output results generated by AskNature. The groups also co-explored their surroundings for ideas on how to solve their solid waste challenges using nature’s principles as a guide. The groups thus connected to nature by selecting four natural champions and studied how they solved their challenges. After this, the fully ideated concepts were co-developed. All the co-exploration, co-connecting, and co-ideation were done on site and not in a class. The final stage was the co-ideation of the conceptual proposal for the waste management challenges. These were some of the comments shared by the participants regarding their immersive experience, learning from nature and nomadic pedagogy:

The materials used in the strategy are all locally sourced, i.e., their organic waste. There will be a constant stream of organic waste being produced by the restaurant, hence, constant materials to compost. Composting uses low energy processes and leverages cyclic processes.

What I have learnt is that we forget about nature and there is a lot we do that we do not think about their consequences but now I know.

The comments show that the students encountered a deep appreciation of nature due to the nomadic pedagogy that was used, which gave them a thorough understanding and better ontological relations to their environment, which influenced the nature of the proposals that they designed.

Making inquiry into the co-exploration, co-connecting and co-ideation through the lens of SLOC

The co-exploration was done from the *Open* perspective in the SLOC context. The participants had the liberty to explore from nature in different ways through the use of the AskNature, which was also supported by their encounters with their immediate surroundings that enlightened them regarding different ways to approach the solid waste challenges. They also shared ideas and cross-pollinated them to produce collective concepts as a result of their different experiences and understanding of systems thinking and how nature connects things beautifully without chaos. The *Connected* dimension also manifested in the exposure of the students to different environments to connect them to nature and to each other, which helped them to direct their co-ideation through the biomimicry lens for contextualised solutions. In the ideation process, the way they approached the challenges was through breaking down into smaller units (reflecting the concept of *Small*). The challenge and then searched for possible natural solutions. The entire exploration of co-ideation processes, therefore, shows that nomadic pedagogy used in design projects embraces the full spectrum of SLOC. This means

encountering the world in a different, immersive way and students may direct their doing and becoming through personal and collaborative encounters with the different phenomena.

Towards conceptualising nomadic pedagogy for the Design+Ecology project in the context of co-design through the lens of SLOC

The nomadic pedagogy, which was used on the Design+Ecology project, affirmed that exposing students to the real problem environments out-of-class creates an enabling space that makes learning happen through experience, inquiry, reflections (Sterling 2009) and doing. The students' engagement in exploring the problem and designing solutions using biomimicry gave the students the freedom to interact with their environment and their colleagues, which defined their process of becoming (Drakers 2022). The process of becoming through the nomadic pedagogy when viewed through co-design and SLOC lens, happened through immersion, exploration and connecting, and ideation in the context of this research. Figure 4 gives a conceptualised summary of the interplay among co-design, SLOC and nomadic pedagogy for a holistic appreciation of the inquiry into the pedagogy.

	Co-design stages for nomadic pedagogy in this project	Defining the contours of the nomadic pedagogy through SLOC	Rationalising SLOC for nomadic encounters
Nomadic pedagogy weakens towards ideation	Immersion	1 Soft guidance with open immersion Students were given orientations and tasks. Through being open and connected, they learnt new things and contextualised their learnings.	Through being open and allowing the flow of ideas from instructors they contextualised the ideas to learn new things.
		2 Students were exposed to nature for them to connect to it from biological and systems' perspective.	Students connected to nature's biological systems's through immersion, which happened through experiencing nature without constrains.
		3 Students were asked to co-immersion themselves to their assigned institutional solid waste generation journey for deeper encounters and understanding to problematise the challenge.	Students co-immersed themselves in local institutions exposing them to local challenges for deeper understanding into the interconnectedness of nature within their local context.
	Exploration & Connecting	4 Liberated but guided mildly Students were allowed to co-explore different spaces for inspirations from nature to understand how nature deals with its problems from biomimicry perspectives and use the solution to solve their problematised challenge. The students were asked to use AskNature for assistance (Online open AI software).	Students co-explored different spaces for inspirations from nature from a <i>Small</i> (problems were put into segments), <i>Open</i> (searched different spaces based on the defined challenge without borders but within biomimicry), <i>Local</i> (all the exploration were done with the local waste materials and resources in mind) and <i>Connected</i> (connected design insight from nature to identified challenge) perspectives.
		5 The students co-connected their identified challenge to natures' challenge and studied how nature solved it and imitated it for their conceptual design proposals.	
	Ideation	6 Fully liberated but without physical encounters The students used the inspirations from nature to co-ideate their conceptual proposals as solutions to their problematised waste management challenge though sharing ideas and cross-pollinating the ideas for collective solutions that were holistic.	The students co-ideated their conceptual proposals as solutions to their problematised waste management challenge through sharing ideas and cross-pollinating the ideas for collective solutions that were holistic, which happened through <i>Open</i> and <i>Connected</i> facets of SLOC.

Figure 4: Conceptualised nomadic pedagogy for the Design+Ecology project in the context of co-design through the lens of SLOC (developed by authors)

Conclusion

Nomadic pedagogy in the context of design in this paper is framed as an experiential learning approach. This approach exposes students to out-of-class, immersive encounters that hold the potential to trigger deeper appreciations and enlightened worldviews, which in turn inform how they 'problematise' design challenges and propose contextual solutions. Nomadic pedagogy therefore can take different forms, and thus it does not have a definite shape, or a prescriptive methodology, but is rather context dependent. Though it has been established that nomadic pedagogy is an open and a liberal way of allowing students to direct their own experiences to define their world-views, the Design+Ecology project engaged in a liberated-but-guided approach to bring value to the participants' experiences. Thus, the main aim of this research was to conduct an enquiry into how the entire nomadic, immersive pedagogical experience unfolded from a biomimetic, co-design perspective through the lens of SLOC.

The findings show that the project happened through the processes of co-immersion, co-exploration, co-connecting, and co-ideation. These processes leveraged the concept of small, thus the problems were broken down into benign constituents, to better understand the challenges. The immersive experience influenced how students explored their environment and their encounter with their surroundings, as well as how they problematised their identified waste management challenges. In the context of *Local*, the students' out-of-class encounters were within a locality or the given institution, which exposed them to the local solid waste generated by the five groups identified, and the associated challenges. It helped them to design their solutions based on local materials and was highly context dependent. In all the processes, the concept of *Open and Connected*, permeated the collaborations among the students in their co-sharing of ideas and connecting their experiences to generate conceptual proposals for waste management in Swellendam. The participants welcomed each other's ideas and reshaped them and also allowed deeper encounters through sharing of experiences for meaning making. This form of learning space in the lens of SLOC provides levity to enable students to generate self-actualisation regarding the agency for co-designing solutions through empathetic experiences that are made tangible through reflections and refractions. Nomadic pedagogy in the context of design, therefore, positions students in an enabling environment, where learning happens through experience, inquiry, and reflection through collective and collaborative real-world experimentations. Though, the research used co-design and SLOC to investigate how the nomadic pedagogy was carried out for a better understanding of how it happens in a design context, we recommend that future research should investigate how course outlines or programmes on nomadic pedagogy are designed or structured as well as the attached aims for easy assessment.

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