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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 share 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-disciplinarity 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 been 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).

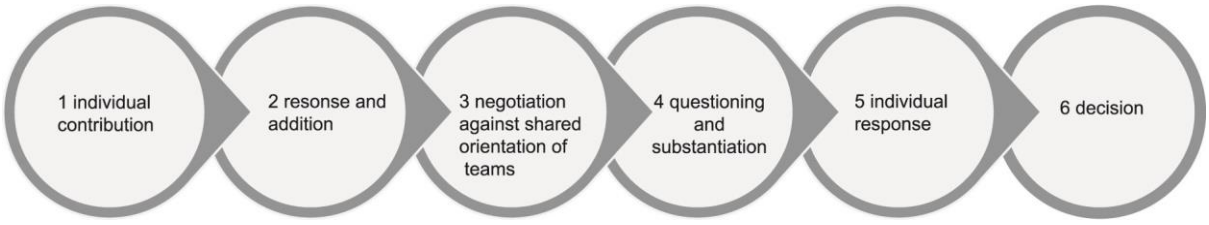

Figure 1: The frame negotiation process (adapted from McDonnell 2009)

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 they are 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 adaptions 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. Chiocchio 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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