Makers space/space making: Understanding the role of a MakersLab in fostering new creative pathways

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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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