MIND THE GAP: CO-CREATED LEARNING SPACES IN HIGHER EDUCATION

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INTRODUCTION

In recent years, there has been a marked increase in the number of new and refurbished building projects in the higher education sector. In Australia alone, public universities, of which there are 40 (TEQSA, 2017), owned $28 billion of building assets, with almost $2 billion being spent on construction in 2015 (Department of Education and Training, 2016). Despite this huge investment, there appears to be a lack of research carried out on the design of buildings, let alone the spaces within them or how these spaces can impact student success. Particularly in a rapidly changing higher education landscape, where key pressures continue to shape higher education, it is surprising that such investment is not commensurate with evidence of the impact of the design of buildings and spaces on teaching, learning and research productivity—key focus areas of universities.

Set against a backdrop of global technological and economic transformation, universities internationally are being urged to provide more personalised and responsive education opportunities to students to prepare them for their future. Rapid shifts in information and communication technologies (ICTs), the rise of the knowledge society, and the drive for both individuals and communities to become lifelong learners have prompted the re-imagining of what may constitute optimal conditions for learners to acquire the dispositions, skills and knowledge required for them to thrive in contemporary society (Fullan & Langworthy, 2014).

Specifically, in a higher education landscape where student-centred learning has been touted as key to building 21st century skills, the design of teaching and learning spaces in higher education should focus on the learner and their needs, rather than more traditional forms of education centred around the teacher's input. This student-centred approach has important implications for the design and flexibility of curriculum, course content, interactivity of the learning process, and increasingly the role of ‘space’. The narrative suggests that well-designed flexible spaces can more readily accommodate the needs of 21st century learners and therefore contribute to raising student performance and learning outcomes in higher education.

It has been argued that traditional teaching and learning spaces on campuses do not seem to particularly engage or support students in collaborative activities. Herrington (2006) writes that large lectures with students passively listening or taking notes to a teacher discussing some theory or topic is still very common. However, while much research has focused on the pedagogy underpinning this scene, less research has discussed the physical contribution to this picture: the
lecture hall. Yet there is growing interest just beginning to emerge on how universities can improve their teaching spaces and meet the needs of the 21st century learners (e.g., Parisio, 2013). While not effectively demonstrated in literature, there are beliefs that physical learning spaces may impact pedagogy and student learning (Mulcahy, Cleveland & Aberton, 2015). Within the Australian higher education sector there was and continues to be a boom of new major building projects (Jamieson et al., 2000) yet subsequent research following the impact of these projects has not been conducted at scale. Still, to date, many aspects of learning spaces is are even questioned; for example, the continuing separation of student and faculty spaces, and of research and teaching spaces (Jamieson et al., 2000).

Boddington and Boys (2011) argue that there is a need to develop frameworks that can help with the design process of learning environments. However, they also note that the learning spaces literature suffers from a multi-disciplinary interest, causing a mishmash of ideas and terms. Yet perhaps given the cross-disciplinary interest in learning spaces, and the need for more developed frameworks, the process of co-design, which advocates for multiple stakeholder participation, may be of use within the learning spaces research. This is particularly so in higher education, where stakeholders tend to have more say.

The warrant for this chapter flows from broader rationales driving the book, which are documented elsewhere, as well as from several more specific objectives. The evolution in the design of learning spaces from a teacher-centred approach to co-designing for a student centred experience is changing the landscape of design practice. To understand the impacts of co-design, the analysis hereunder explores how co-created physical spaces within universities can facilitate and enhance student learning. Drawing on insights globally, the chapter concludes that co-creation of spaces should include the largest user group, that is the students. Such collaboration of the design of learning spaces can benefit student learning and engagement, as well as the attributes necessary for graduate employability in the 21st century.

UNDERPINNINGS OF CO-CREATION AND CO-DESIGN

Wenger (1998) writes that learning is a social process where multiple stakeholders or community partners interact with one another to challenge and develop new knowledge and ideas. In this frame, the process of co-creation, where stakeholders can contribute to the inputs or design of the learning activity or environment in higher education is not particularly novel (Kangas, 2010). Further, as in Wenger’s view, learning is not static in co-creation, nor a process of transmission, instead through the social environment, learning is dynamic and, in fact, co-created (Säljö, 2006).

Knowledge co-creation, therefore, is a process that emerges from the interaction and construction of multiple perspectives and/or artefacts (Paavola, Lipponen & Hakkaraainen, 2004). Kangas (2010) additionally writes that knowledge co-creation is not only a social process where new knowledge emerges, but also a process
where new knowledge is socially validated through the interaction of multiple stakeholders. Nonaka and Konno (1998) align this to a theory within Japanese culture of knowledge creation known as *ba* (see Figure 1) meaning a shared space that serves as the foundation for new knowledge. According to them, awareness of the different characteristic of *ba* can facilitate successful creation of knowledge and when shared, form the knowledge base of organizations (Nonaka & Konno, 1998).

Figure 1: Social construction of knowledge (Source: Nonaka & Konno, 1998)

Co-creation and co-design are often entangled and used without distinction from one another. Sanders and Stappers (2008) define co-creation as any “act of collective creativity that is shared by two or more people” (p.6). Through this definition, Sanders and Stappers (2008) note that co-design can be defined as one act of co-creation, which spans the design process. Therefore, while the aims and objectives of the co-creation process are varied, within the co-design process the aim is limited to a new design of a product or service (Kleinsmann, 2006). In particular, Sanders and Stappers (2008) note that attention is beginning to focus or concentrate towards the ‘fuzzy’ front end of the design process, as it is chaotic and ambiguous. Arising from the front end of the co-design process are ideas, concepts, and eventually prototypes and products.

Broadly, co-creation as a term rose to prominence famously in the Prahalad and Ramaswamy 2004 book, “The Future of Competition: co-creating unique value with customers”. They write that an underutilized resource of many organisations
are user perspectives, user knowledge and user experiences. They note further that the firm-centric view of an organisation, whereby only the designers are part of value creation process, is changing rapidly as users increasingly express desire to co-create value with the firm, either through a co-design or similar process (Prahalad & Ramaswamy 2004). Therefore, a process of co-creation, which breaks down the barriers between the organisation and the user, may allow for users to more adequately express their preferences and opinions, and contribute to the value of the products and/or services.

Co-design as a form of co-creation comes from sustained effort in design thinking to create ‘user-centric’ approaches. Traditionally, this is a break from original design thinking, which was previously conceptualized a situated within only the mind of the designer and their skills (Rowe, 1987). Rowe, for example, writes that design thinking is an interior situational logic of the designer and their subsequent decision-making processes (Rowe, 1987). This idea of design thinking has further been supported by Hebert (1969) who wrote that in contrast to natural sciences, where complex interactions naturally create, the design process is an individually centric and artificial process.

However, more recently, design-thinking literature has begun to question these definitions, with Kimbell (2011) noting that one of the most critical shortcomings of design thinking theory is that it rests on designers as the main agents of design. In contrast, therefore, to traditional views on design thinking, new paradigms emerging more recently reflect that changing shifts in society towards more participatory designs. Participatory design has its origins in the 1970’s, in Nordic countries, as a more democratic approach to designing practices in the workplace (Muller & Druin, 2002).

Participatory design marks a shift in the design process, as users are involved in the process; however, the decision-making remains in the hands of the designers. In the process of participatory design, for example, the researcher (or sometimes the designer) is considered to be the interpreter of what the user may want or need (Sanders, 2002). Yet participatory design does not directly recommend the inclusion of the user in the design process, and instead, participatory design was a force in shaping the co-design thinking literature (Sanders & Stappers, 2008). Thus, while co-design and participatory design have similar foundational theories towards user-centric approaches, they should not be used interchangeably. The key distinction between the two is the distinction between who has the power for decision-making. In participatory design, the researchers and designers have the decision-making authority; whereas in co-design the participants are given equal decision-making power to the designers (Casali, 2013).

EXAMPLES OF CO-DESIGN IN BUILDING PROJECTS

Participatory design and co-design is beginning to be applied to a range of building projects. As noted earlier, sometimes it is difficult to differentiate between examples of participatory design and co-design as much of the literature uses these terms interchangeably, even though a distinction exists. Despite this, the examples
of participatory design and co-design have provided an interesting, albeit burgeoning, new direction in design thinking.

For example, in Ljubljana, Slovenia, participatory design was used in an effort to include local residents’ opinions on a revitalization project of an estate (Kos & Potocnik, 2005). Before the project began, researchers noted that a large obstacle in the redesign process was the local residents’ perception of the estate, and also a general negative feeling towards institutions. Through holding several workshops where residents were allowed to voice their opinions, residents eventually overcame their initial distrust and concerns with the project (Kos & Potocnik, 2005). This case highlights how participatory design can help reduce tensions between user groups and service providers to create greater buy-in for a project.

Another commercial project utilizing co-design was found in a New Zealand based architecture firm called Co-Design Architects, which specializes in co-design for commercial renovations. They have completed a range of projects. One example is the Karori Anglican Church. The process involved a range of meetings, workshops and interviews resulting in a two-phase renovation project (Co-Design Architects, 2017). Users were able to identify specific concerns that resulted in the design solution. For instance, the church members expressed concern over safety for cyclist and pedestrians accessing the site, so they created a perimeter driveway, drop off areas, go slow areas, and additional parking areas (Co-Design Architects, 2017).

Within higher education, there are also a few examples of co-design, for example at Monash University in Australia where co-design has been utilized in international development projects in Fiji and Indonesia. The Monash Art Design & Architecture School (MADA) is a leader of co-design events in working with residents in informal settlements on how to integrate nature-based water management into their buildings (Monash University, 2017). The project involved students from the University of South Pacific who undertook the household surveys and co-design activities helping residents design a safer community (Monash University, 2017).

Another example in relation to higher education students can be found in the City of Bandung in Indonesia. A renewal project on a residential rental building was expanded to involve a participatory process with students involved in what kind of space they would like (Nurdini & Harun, 2011). Students were able to voice their opinions to the housing provider and give details to what type of space they would like (Nurdini & Harun, 2011). Yet due to the inexperience of the students in terms of expertise of design and architecture, and the lack of transparency with the students about the budget constraints, some of their requests were unable to be fulfilled given the financial costs or current technology available.

The University of California Berkeley also conducted a co-design exercise for housing in Pinoleville Pomo Nation, a first nations community. Part of the goal of the project was to expose students to first nations culture and lifestyle, as well as to get residents involved in the housing design process (Perez, Shelby, Edmunds, James, & Agogino, 2015). Students as well as the participating architects learned valuable lessons about building users. For instance, tribe members explained how
straight corners should not be used in the home because in their culture, their belief is that they invite bad spirits (Perez, Shelby, Edmunds, James, & Agogino, 2015). This example highlights how co-design interventions may be continually applied to minority environments whereby the mainstream ideas may be questioned.

The co-design process has also seen some examples involving youths. For example, the Sorrell Foundation has utilized co-design for youth centres in England. The collaborative process allowed youth to learn about the design process while participating in the project in a meaningful way (The Sorrell Foundation, 2010). The process was used for 15 youth centres. The projects teamed residents up with architectural and branding firms to create concepts for their youth centres. The process involved developing a design brief through workshops, then later refining ideas through further engagement. The end of each project was marked with celebration events (The Sorrell Foundation, 2010).

Similarly, at a primary school in Finland, students participated in a co-design process for renovating their school (Tilassa, 2015). The project involved developing new ideas for furniture and redesigns of some of the spaces. Students participated in a multi-media engagement process that involved a range of techniques including discussions and the creation collages of how they wanted things to look (Tilassa, 2015). Additionally, in another example, architecture students were paired with primary school students to conduct a participatory design exercise. The partnership between Deakin University and Wales Street Primary School, both located in Australia, conducted a four-week project to design a playground (Lozanovska & Xu, 2012). The project culminated in a scale model of the designed playground. Primary students were able to participate in the design of a project where they would be the central users. The success of the project has led Deakin University to pursue collaborations with other primary schools (Lozanovska & Xu, 2012).

These case studies generally present a positive outlook on the potential of co-design, while some help to identify some of the challenges. The common trend appears to be users being able to express their unique needs. Further, the process appears to mitigate some of the power imbalance that can arise between designer and users in many of these projects.

CO-CREATION IN THE DESIGN OF LEARNING SPACES IN HIGHER EDUCATION

Co-creation has been applied in many areas within higher education, especially areas where student input may serve an ethical purpose. To date, much of this application has been towards the aim of curriculum creation (see examples in Bravenboer, 2016; and Bovill, Cook-Sather, & Felten, 2011). Another area that has gained interest in co-creation is the development of student data and learning analytics (see examples of Dollinger & Lodge, 2018; Slade & Prinsloo, 2013). There are many benefits to co-creation, as discussed above, including low-cost innovation, buy-in and long-term adoption, improved student-staff relationships, and productivity and efficiency gains.
In *Towards Creative Learning Spaces*, the author highlights the importance of the design of learning spaces in shaping learning outcomes (Boys, 2011). She notes that while there is a lack of literature on pedagogical building design, the practice will likely be informed by the available literature on corporate campus design (Hadfield, Kinkead, Peterson, Ray, & Preston, 2003). Theorists have long argued that participation should play an important part in pedagogical design. For instance, in *The Oregon Experiment*, the authors argue that participation is key to the design of educational institutions (Alexander, Silverstein, Angel, Ishikawa, & Abrams, 1975). Further, they use the university context as an example, arguing that the daily users of the building know more about their needs than anyone else (ibid Alexander et al). They note that participation in the design of the space is important for the students and faculty to feel ownership of their classrooms and labs. Yet Hadfield et al (2003) also note that the ideas proposed by Alexander and his colleagues are idealistic and do not reflect practice on campuses, where master plans set out development over the long-term, and faculty and students likely cannot even find the offices of the people making these decisions (Hadfield, Kinkead, Peterson, Ray, & Preston, 2003).

However, participatory design and co-design are likely to expand more and within new areas in the higher education context. In his proposal for how classrooms should be renovated to meet the needs of the 21st Century, Owu (1997) recommends getting input from students and faculty through questionnaires and surveys. In his examination of emerging practices for the design of university spaces, Bligh (2014) further argues that involvement from students and faculty should go beyond bounded activities and create long-term relationships with stakeholders through a decentralized process. He further asserts that the design process can be a way of asserting academic values on an institution through an ongoing process of discussion, design, and collaboration (Bligh, 2014). This ongoing practice of co-design and collaboration can help to shape the culture of an institution.

Several universities do, however, make use of integrated co-design into the development of their campus buildings. For example, co-design was utilized in the planning of ‘The Loft’ student space at Graz University of Technology in Austria (Tuulos & Kirjavainen, 2016). The study focused on the role of physical space in experimental learning, but offers valuable lessons regarding co-design. It found that students described the space in terms of their practical experience; they talked in terms of what they could do in the space, such as work and relax. Yet on the other hand, faculty spoke about the project in terms of big picture ideas relating to the students’ experience, such as creating and identity formation and enforcing the idea of a creative space. The author describes the co-design as a critical component of the creation of an experimental learning space (Tuulos & Kirjavainen, 2016). Further, they note, the space did not have pre-defined norms of how to use it, so the students and faculty were not limited to the experiences expected in a typical classroom (Tuulos & Kirjavainen, 2016).

In another example, at California Polytechnic State University, undergraduate computer and engineering students participated in a co-design discovery process.
for designing the library’s digital interface. The students evaluated a human-computer-interface and provided a report of recommendations to the librarians. This report was also shared with the vendor of the software, who integrated several of the students’ recommendations into the interface (Sommerville, 2007). The project later expanded to the design of physical learning spaces. The students’ ideas challenged planner perspectives by proposing a blend of formal and informal learning spaces. The project not only created improvement to the library design, but also created relationships between the students and the librarians that lasted beyond the projects (Sommerville, 2007). As technology becomes increasingly integrated in higher education, the digital learning environment will play an equally important role to the physical one.

Additionally, the Australian-based design firm Co Design Construct has utilized co-design for projects with several educational institutions including primary schools and universities (Co Design Construct, n.d.). One project was the remodel of the Student Services Building at the University of Adelaide Waite campus. The process stripped down the centre for a total redesign to create a dynamic student space (Co Design Construct, n.d.). The University of Adelaide has utilized participatory design for several student hub projects. The design of the Hub Central building included 9000 hours of student involvement allowing students to shape their learning environment (Mills, 2011). The number of projects undertaken by the University of Adelaide that utilize co-design exemplifies the incorporation of co-design into organizational culture.

This collection of case studies of co-design is most likely far from exhaustive. Many of the examples of the co-design process in higher education does not make it into the public sphere of knowledge, with perhaps many interventions conducted as part of internal university processes or activities. However, from this list of examples, it can be seen that co-design has been widely applied and is likely to continue to expand. Further co-design may address many of the needs of higher education today including hearing from misaligned or disadvantaged groups, engaging students, and serving the needs of an increasingly diverse student population.

THE IMPACT OF CO-DESIGN PROCESSES ON STUDENTS

An early study conducted in the UK provides evidence on the links between building design and recruitment, retention and performance of staff and students in the higher education sector. The case study of five higher education buildings found that most students identified structural and functional features, including the quality of the facilities, the library, sports centre, atriums and lecture rooms as key features of buildings that would most influence their decision to study in a particular institution (CABE, 2005). In the same study, students indicated that the features of the buildings they studied in affected their performance in three main ways: by helping motivate them in their work; by facilitating inspiration amongst students; and by providing key facilities critical to the course content (CABE, 2005).
Another study in Finland found that participatory co-design, when a multitude of stakeholders is involved, has positive impact especially on students. The study by Mäkelä, Lundström & Mikkonen (2015) found that participatory co-design (i.e., collaborative design) of learning spaces can, firstly, support the understanding of users’ needs and thus improve both the desirability and adequacy of the design from the user perspective. Second, participatory design is supportive to a democratic organizational culture. Third, increased ownership and dominance of co-designed solutions can lead to their more efficient use in teaching and learning and thereby support obtaining better learning outcomes (Dollinger & Lodge, in press).

Consequently, by involving students in the co-design of buildings, it will not only impact on the structure of the building, but also the students themselves. Dollinger and Lodge (forthcoming) write that three broad areas are likely to be impacted by the co-design process, including students’ quality interactions with staff or faculty, student satisfaction and student graduate capabilities. For example, as the co-design process requires a sharing of decision-making responsibilities, students and participating staff may exhibit increased trust and respect for one another, given their ongoing interactions.

This impact may be critical for those working to improve the higher education sector, as building trusting relationships with students often relates to long-term engagement that may improve other student outcomes, including learning (Bowden, 2011). Additionally, given the authentic context of co-design processes and the application of real skills that students perhaps learn in a classroom previously, the co-design process may have the potential to improve students’ graduate capabilities, and confidence in themselves when preparing for the workforce.

Participation in the co-design process for students also draws some parallels to work-integrated learning (WIL). WIL courses or opportunities are geared towards helping students apply theories and knowledge they have learned in a more traditional classroom setting in authentic real-world applications. Globally, as many universities are linking their value to their ability to help students transition to the workforce, WIL courses have become increasingly popular (McLennan & Keating, 2008). By creating opportunities for students to gain real world experience, WIL courses have been shown to improve student confidence and gain a clearer understanding of their skills (Coll, Lay and Zegwaard, 2002). Additionally, Jackson (2015) found that WIL courses positively influenced student perceptions of their peers and students, suggesting that teamwork and collaboration in an authentic setting may help students feel like they belong at a university.

BARRIERS AND IMPLICATIONS

Co-design is a growing area of interest within architecture and building design. Chun (2016) writes that, traditionally, building design users involved in the participatory design method gave feedback but not equal decision-making power. However, in some areas such as the UK, co-design is becoming increasingly
common. Yet Chun also warns that co-design, as a mechanism in building design, can be problematic as many architects are not well trained in the co-design process (2016). Further when bringing new stakeholders into the design process, conflict can arise if the architect’s opinion or expertise is questioned or challenged.

For example, Chun gives the example of an architect designing something visually beautiful, but perhaps not useful to the users of building, thus the aims of the designer and the user are in conflict and can cause issues in a co-design interaction. However, architectural visual aspirations aside, if the goal of the building is to serve the needs of its users, the co-design process should help, rather than hinder the process. McDonnell (2009), through conducting a study of how designers communicate to building-user/clients, found that designers often espouse their expertise when in conflict with others, thus challenging the balance of power that is typical in a co-design process. Additionally, there may be language barrier in the terminology used on both sides. Thus, the co-design process, without proper support and training for both designers and users, can falter.

The inexperience of many users with the design process has encouraged some literature to advocate for the co-design process to work with ‘lead users’ (e.g. von Hippel, 2005). Lead users are particularly invested users who have shown, perhaps through community forums, their interest in the design process of the products or services they use. However, even still with lead users, there are a select few who are capable of sharing resources that will eventually be useful to the organisation. Further, a downside to using lead users rather than an open inclusive co-design process is that the best ideas or perspectives may still be outside of this community or specific group of users (von Hippel, 2005).

In fact, the uneven distribution of power is not the only problem associated with the co-design process. Time is another often-cited constraint to the co-design process, not only with the time it takes to actually co-design through series of meetings and consultations but also the time the process requires of the users who are participating (Del Gaudio, Franzato & de Oliveira, 2016; Dollinger & Lodge, 2018). As co-design is often a voluntary process for users, with their time being unrewarded and most likely unpaid, it can be difficult to find willing participants. This is an especially critical point to discuss in relation to equity, as the co-design process should not be restricted to only those who have the pre-existing time and/or resources and funding to share their voice.

By exploring user motivations some of the barriers to co-design, such as finding willing participants, may be resolved. Studies have shown that in certain situations, intrinsic motivation is already present, such as parents who are genuinely interested in to help design toys for children (van Rijn & Stappers, 2008). This may point to the importance of including the right type of users who have a pre-existing interest or concern in the project. They also found that by relinquishing control in the design process, user ownership may increase and users begin to feel they are responsible for the end product or design (van Rijn & Stappers, 2008).

Pirinen (2016) also writes that two issues with the co-design process are the challenges to pre-existing institutional culture and different incentive systems. This relates back to Chun (2016) who wrote that the differing aims and objectives of
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designers versus users motivates each stakeholder group to act in a unique way. Pirinen’s position on the challenge to institutional culture is equally interesting, however, as co-design often faces resistance as a new and unfamiliar idea. Co-design, even organizationally internal co-design, requires coordination across departments and disciplines, which comes with its own suite of challenges. For instance, there may be time constraints on the project delivery date and the resulting conflict with course and assignment timelines of students.

As similarly found with Del Gaudo, Franzato & de Oliveira (2016), the time required of the co-design process can further limit how employees/designers would adopt the process, as the process can be slow, especially in the beginning when first acquainting oneself with the process. Pirinen (2016) recommends that in order to mitigate these changes, co-design should be implemented originally as part of the institution’s culture, rather than just within a single project, as this would allow for a more holistic adoption over a period of time. Similarly, in regard to the design of learning spaces within education towards a shared learning environment has further shown disputes between designers and students, with students feeling the designers’ perspectives may negatively impact their learning (Konings, Sidel & van Merrienboer, 201). However, the co-design process may help support students’ perspectives thereby ensuring that the space suits their needs (Konings, Sidel, & van Merrienboer, 2014).

CONCLUSIONS

There is constant pressure in the higher education sector to ensure student engagement is achieved to support a positive student experience and consequently high quality learning. Learning, however, does not just take place in the mind of the learner, nor the community in which he or she learns. It also takes place in an environment, whether it is a classroom, a lecture theatre, a maker space, or library. Emerging evidence is beginning to show that the environment in which learning takes place is an important indicator of the quality of students’ learning experiences and a building block to support deep, rich learning.

Traditional full-time students spend much of their time on campus, and yet research has only begun to explore the relationship between students’ physical environments and their overall student experience. For instance, how does a student centre bring students together with their peers? How does a library facilitate quality of learning? How can a learning space support group work and peer-to-peer learning? These questions and many more linking physical spaces to the overall student experience are important for continued understanding of what constitutes and facilitates student engagement in higher education. In short, research focuses too often on only the pedagogical stakeholder relationships and the outcomes of the student experience without considering a critical foundational element, the environment in which it takes place.

However, for universities to overcome the challenges and issues of designing innovative environments for students, students need to be actively involved in the process. The evolution in the design of learning spaces from a user-centred
approach to co-designing is changing the landscape of design practice. Through value co-creation, where students jointly work with designers, faculty and staff, students can integrate their ‘voice’ in co-designing learning spaces in order to improve the provision and delivery of higher education for the institutions, but also enact improved outcomes and skills required for the 21st century knowledge society.

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