Innovating Lecturing: Spatial Change and Staff-Student Pedagogic Relationships for Learning

Renae Acton

James Cook University, Australia

Lecture halls, an enduring feature of higher education landscapes, are undergoing a spatial revolution. These materialize pedagogic imaginaries of technology-enhanced, student-centered learning. This article investigates the pedagogic performance of a contemporary lecture theater in regional Australia, distanced from a capital city, presenting mixed-method data from a broader case study. Four design principles – learner-centricity, connectivity, flexibility, and affordances – organize the analysis, finding that spaces, technologies, staff, and students work in conjunction to enact a spectrum of teaching modes. In practice, staff pedagogic repertoires, spatial literacies, and teaching philosophies entangle in socio-spatial pedagogic relationships that facilitate, rather than dictate, student learning in lecturing spaces.

Introduction

Despite suggestions that they are increasingly redundant due to their alignment with a transmission approach to teaching (Dane, 2015; Ellis & Goodyear, 2016; Palmer, 2012), lecture theaters remain a persistent fixture of university landscapes. Recent examples include lecture spaces at the University of Leeds in the United Kingdom (Campus Development, University of Leeds, 2017); the University of North Carolina (Henshaw, Moore & Moy, 2016) and University of Minnesota in the United States (Negrea, 2016); and the Queensland University of Technology in Australia (Formula Interiors, 2015). New lecture theaters, while replicating the financial efficiencies of one-to-many teaching (Radcliff, Wilson, Powell, & Tibbetts, 2008), include a number of physical changes to invite a range of pedagogies beyond a traditional didactic approach.

In practice, however, evidence of sustained change in teaching within various innovative spaces appears contentious. Adedokun, Parker, Henke, and Burgess, (2017) found a significant impact on group work and staff-student interaction. Additional positive impacts on teaching, including infrequent lectures and frequent discussion, are also reported by Scott-Webber, Strickland, and Kapitula (2013), Brooks (2012), and Whiteside, Brooks and Walker (2010), however other studies contradict these findings. Fox and Lam (2012) found that students reported that "most of their teachers still taught in a traditional teacher-dominant way" (p. 76), mirroring other findings (Dane, 2010; Kirkwood & Price, 2013). Henshaw, Moore, and Moy (2016) suggest that faculty, staff, and students may be reluctant to change to active learning approaches, a tension noted in several studies (Fisher, 2004; Kirkup & Kirwood in Steel & Andrews, 2012; Savin-Baden, Macfarlane, & Savin-Baden, 2008). In addition, Matthews (2017) reports that even when

can resist implementing them in their own classes, particularly if they are not consistent with their pre-existing views of what constitutes 'good' teaching.

This tenuous evidence base for the impact of space on pedagogic practice complicates the policy objectives of university infrastructure transformation. The rhetorical premise of spatial transformations often rests on assuring innovative teaching and learning experiences. In Australia, the now discontinued Educational Investment Fund (Australian Government, 2008) directed 'strategically-focused' investment into higher education buildings that would "transform Australian tertiary education" (para. 5). This spatial-educational transformation is implicitly underpinned by a socio-constructivist teaching and learning philosophy, where students experience social, dynamic, and engaging learning, and are positioned as active directors in their own knowledge construction (Adedokun et al, 2017; Dane, 2015; Hall-van den Elsen & Palaskas, 2012; Hunt, Huijser, & Sankey, 2012; Steel & Andrews, 2012). However, when universities focus on spaces that assure 'student-centered' learning, often the role of staff in fostering and implementing this approach, as engaged facilitators or guides who extend student thinking in personally responsive ways, is indirectly silenced (Dane, 2010). This kind of imagined transformation suggests an interwoven spatial-cultural revolution, which requires mutual attention to spaces and technologies, along with pedagogies, relationships, and the staff and students who engage in the processes of doing learning (Acton, 2018, 2017; Blackmore, Bateman, Loughlin, O'Mara, & Aranda, 2011; Boys, 2011; Steel & Andrews, 2012; Reushle, 2012).

This article first briefly explores literature on pedagogies as spatial practices, then moves into common underlying design principles that inform innovative construction intended to facilitate active and collaborative teaching-learning approaches. Following this, the study's

Renae Acton is a PhD Candidate, James Cook University.

methodology is presented, along with data from staff interviews, student focus groups, and teaching observations.

Literature Review

Performing Pedagogies

The design of new and redeveloped lecture theaters intends to facilitate student-centered learning. Traditional didactic pedagogies involving teacher-centric instruction are no longer considered sufficient to engage and motivate digital learners (Brown, 2005; Dane, 2015; 2010; Oblinger, 2005). In response, higher education teaching has shifted towards collaborative and active approaches, reflecting social-constructivist theories of learning (Biggs, 2003; Cheers, Swee Eng, & Postle, 2012; Dane, 2010; Fox & Lam, 2012; Hall-van den Elsen & Palaskas, 2012; Hunt, Huijser, & Sankey, 2012; Jamieson, 2003; Kalantzis & Cope, 2008; Steel & Andrews, 2012; Stewart, 2012; Wilson & Randall, 2012). This transition has been attributed to a greater awareness of the identified shortcomings of traditional teaching methods (Adedokun et al, 2017; Biggs, 2003; Kalantzis & Cope, 2008; Steel & Andrews, 2012) and to better respond to students' preferred learning styles (Brown, 2005; Ellis & Goodyear,

2016; Oblinger, 2005; Souter, Riddle, Sellers, & Keppell, 2011; Tinto, 2009). Further, dynamic social pedagogies, supported by technologies, provide opportunities for students to develop necessary digital literacies, communication capabilities, and critical thinking skills needed for work in the global society of the future (Fisher, 2004; Payton, 2012; Oblinger, 2005). This progression highlights the spatiality of learning (Fisher, 2004), as well as the growing awareness of the ways learning space design, material technologies, and teaching and learning experiences are interlaced in practice.

As a tool for considering teaching possibilities across multiple university spaces, Radcliffe, Wilson, Powell and Tibbetts (2008) developed a framework of pedagogic modes, using the terms *didactic*, *active*, *discursive*, and *reflective* to classify behaviors that might be observable in learning spaces. The modes proposed by Radcliffe et al. (2008) provide a useful organizing device for synthesizing the purposes and common strategies of higher education teaching and learning, in a way that is particularly useful for observing practice (see, Table 1). Ideally, spaces for university learning anticipate the flexible enactment of teaching and learning across a spectrum of pedagogic modes.

Table 1: **An Elaboration of Radcliffe et al.'s (2009) Pedagogic Modes**

Pedagogic Mode	Description	Purpose	Alignment with other models
Didactic	Teacher as 'knower' and students as passive receivers (Wilson, Lukin, McGavin, Eagle & Sutton, n.d.)	To communicate already organized information or content	• Teacher-controlled/ managed (Biggs, 2003; Biggs & Tang, 2011) • Didactic Mimesis (Kalantzis & Cope, 2008)
Active	Student-centered learning, affording opportunities to engage deeply in learning with elements of personal choice, multiple perspectives, self-discipline, critical thinking and developing their opinions and connecting this to pre-existing knowledges (Wilson et al, n.d.)	To engage students in action – the focus is the activity and the outcome	• Teacher-controlled/ managed; student centered/peer controlled; student managed (Biggs, 2003; Biggs & Tang, 2011) • Authentic synthesis (Kalantzis & Cope, 2008)
Discursive	Ensuring students participate in learning activities through language is the focus of the Discursive mode. Examples of teaching and learning behaviors include discussion with peers, questioning, and individual or group student presentations (Wilson et al, n.d.)	To promote learning through interactive communication and discussion – the focus is on the process of using language as a tool for learning	• Peer Controlled/ Student managed (Biggs, 2003; Biggs & Tang, 2011) • Transformative reflexivity (Kalantzis & Cope, 2008)
Reflective	The reflective mode of pedagogy incorporates intrapersonal time, allowing for individual synthesis of ideas, thinking and reflecting on learning on learning outcomes (Wilson, et al, n.d.)	To allow individual development, connection, refinement and understanding of concepts	• Self-controlled/ individually managed (Biggs, 2003; Biggs & Tang, 2011) • Authentic synthesis (Kalantzis & Cope, 2008)

Contemporary Lecturing Spaces: Principles for learning infrastructure

The possibilities for practice are imagined in particular ways within lecture theater design. This spatial archetype embodies a pedagogic approach founded on the transmission of knowledge (Ellis & Goodyear, 2016) where teachers instruct and students are positioned as passive receivers, although the assumption that this automatically constrains practice is problematic (see Boys, 2011). The tension is that traditional lecture halls subtly endorse didactic lecturing as the 'default' mode of teaching: "lecture theatres can, quite simply, limit active learning by encouraging forward-facing passive engagement" (Carnell, 2017, p. 7).

In this way, traditional lecture spaces may constrain opportunities for students to interact with information in personal ways, with each other, or with teachers – factors that have been identified as contributing to student attrition and limited student outcomes (Dane, 2015; Radcliffe et al., 2008). Implementing student-centric lecture theaters which encourage collaborative learning, active engagement with content, and interaction among staff and peers, reflects social change in the way learning processes are understood, particularly acknowledging that effective learning requires a teaching approach that goes beyond the transmission of knowledge (Biggs, 2003; Biggs & Tang, 2011; Hattie, 2011; Kalantzis, & Cope, 2008; Mulcahy, 2013). Further, an innovative lecture theater imagines and seeks to construct a future that redistributes power to university students as architects of their own learning experiences in higher education contexts.

While specific configurations of lecture halls may vary, there are numerous models of generalized design principles that promote a spectrum of pedagogic action. A concentration of studies focus on the physical elements of designing effective spaces (Blackmore, et al, 2011); this article synthesizes those into four interconnected principles of learning space design that reflect identified commonalities: spaces should be *learner-centric*, foster *connectivity*, allow *flexibility*, and provide appropriate digital *affordances* that enhance learning. Rather than being discrete categories, these areas connect and overlap, working in tandem to develop spaces that support teachers and learners. The entangled design principles include:

Learner-centricity – student-centered spaces are designed to motivate students (Keppell & Riddle, 2012) by maximizing student access to and ownership of learning environments (Jamieson et al., 2000). They are designed around people (Oblinger, 2005), with comfort and ease of use as explicit priorities to support both physical and mental well-being (Souter et al., 2011). Spaces focused on learners embrace creativity to energize and inspire learners and tutors (JISC, 2006) with technology that is intuitive and user-friendly (Radcliff, 2009, cited in Reushle, 2012).

Connectivity – connected spaces promote and enhance authentic learning interactions, social collaboration, and interaction (Keppell, & Riddle, 2012; MCEETYA, 2008; Oblinger, 2005; Radcliff, 2009, cited in Reushle, 2012). In addition, connection to the learning is paramount. Spaces that support 'flow' – when the learner is completely engrossed in learning experiences (Souter et al., 2011) – are underpinned by the principle of connectivity. Open spaces which allow student and staff movement, shared social spaces, and unstructured learning areas are exemplary connective spaces.

Flexibility – spaces should be flexible in supporting multiple teaching and learning approaches, (Jamieson et al., 2000; Keppell, & Riddle, 2012; Oblinger, 2005; Radcliff 2009). Ideally, spaces will be able to be repurposed for multiple uses (Souter et al., 2011). Flexibility is frequently offered by the provision of movable and adaptable furniture and fittings to allow for different teaching-learning purposes. Examples include writable walls and chairs on wheels.

Affordances – ideal spaces for learning embed digital technologies or potential for Bring Your Own Device (BYOD) to allow for a range of action possibilities (Keppell, & Riddle, 2012). These provide opportunities for student control (Jamieson et al., 2000), multiple possibilities for a blend of face-to-face and technology-enhanced learning activities (Oblinger, 2005; Souter et al., 2011), and enabling technological and pedagogical exploration (JISC, 2006; Radcliff, 2009, cited in Reushle, 2012). Technologies support diverse action possibilities, including lecturing and teacher-led instruction, with the ability to foster group work, and individual or group reflection.

Although these design principles are useful to guide the creative development and construction of spaces, the focus on spatial design is often not informed by an empirical understanding of the sustained impacts of changed learning spaces on practice, social relationships, and student outcomes (Blackmore, et al, 2011; Cleveland & Fisher, 2014; Ellis & Goodyear, 2016; Hall-van den Elsen & Palaskas, 2010; Lee & Tan, 2011). This view requires recognizing the ways in which spatial configurations, technologies, and practice work as assemblage (Acton, 2018, 2017; Cleveland & Fisher,

2014; Ellis & Goodyear, 2016; Fenwick, 2015; Mulcahy, 2013; Mulcahy, Cleveland, & Aberton, 2015; Savin-Baden et al, 2008). Rather than suggesting a static arrangement, assemblage refers to the shifting process of arranging, the connections, flows, and becomings that emerge relationally between bodies, technologies, things, ideas, practices (Kennedy et al, 2013 in Mulcahy & Morrison, 2017). While a great deal of attention has been given to the organization and design of spaces "more subtle research is needed to uncover the range of functions that lectures and lecture theatres enable" (Ellis & Goodyear, 2016, p. 166). This article speaks to this silence.

Methodology

The case of *Knowledge Hub* recalls the design, initial occupation, and sustained inhabitation of a new learning space by a group comprised of education disciplinary staff and students in regional Australia. Completed in 2013, *Knowledge Hub* embodies the four innovative design principles across unstructured social spaces and formal learning areas, including the lecture hall. A case study approach is suitable for understanding situated phenomena, in particular where the boundaries between context and phenomena are blurred (Heck, 2011; Yin, 2003). This mirrors the sociomaterial theoretical orientation of this study, which understands that human and non-human beings exist together, inseparable, in the relations-between self, society, and spaces (Acton, 2018, 2017; Fenwick, 2015; Massey, 2005; Mulcahy 2013; Mulcahy et al, 2015; Orlikowski & Scott, 2008). The case takes a mixed methods approach, which is "well suited to support rigorous examinations" (Harwell, 2011, p. 157). Cleveland and Fisher (2014) strongly advocate that in relation to evaluating the pedagogical performance of learning spaces, mixed method approaches are most suitable, recounting Powell (2008) who suggested that various data collection methods are appropriate, particularly promoting direct observation, structured interviews and focus groups. Data from each of these methods are presented.

The implementation and analysis of qualitative staff interviews and student focus groups were guided by the Most Significant Change (MSC) approach (Davies & Dart, 2005). Direct observation as a quantitative method for investigating the relationship between learning spaces and teaching is outlined below. Included here are data related specifically to the lecture hall from two phases of the broader doctoral research: staff interviews (10 participants) and student focus groups (36 participants in nine focus groups) conducted in 2013, as well as observations of three staff members' teaching across four teaching episodes (completed in 2015). This is supplemented by interview and focus group comments to illustrate the sustained ways teachers' and students' purposes affected the enactment of space, technologies, and pedagogy in practice.

Observations of Practice

Observations offer unique insight into performed pedagogies and are particularly valuable in contextualized investigations (Cleveland & Fisher, 2014; Heck, 2011; Yin, 2003). Direct observations provide information on the extent of implementation of initiatives and are a way of triangulating what people say they do with their in-practice behaviors (Heck, 2011). The subjective nature of observations (Yin, 2003) led to the use Wilson, Lukin, McGavin, Eagle & Sutton's (n.d) template for exploring the 'Performance of the Room', recording didactic, active, discursive, and reflective teaching modes in practice (see Appendix A) in an attempt to enhance the validity and reliability of the method. Wilson et al. (n.d.) used these pedagogic categories to capture teaching and learning in an innovative learning space minute-by-minute according to the enacted mode of teaching, simultaneously recording the complementary digital technologies used. This provided a transparent way of evaluating the relationship between pedagogic practice, space, and technologies. The template also provided a structured way of quantifying observations, allowing for a comparison of teaching modes enacted. In addition to recording the mode of teaching, written qualitative notes were taken on the strategies being used within each mode as a way of clarifying and justifying selection, and, when necessary, communicating any uncertainty in categorization of practice with participants. The list of strategies (see Appendix B) serendipitously became useful as a way of recognizing and valuing staff members' enacted pedagogic repertoires of practice.

While the observation template uses distinct categories, the process of classifying modes was complicated. It was difficult to make a clear distinction between active and discursive modes as both often involved students in collaborative learning strategies and activities. When categorising the mode was at times layered, complex and messy (Law, 2006), the main purpose of the pedagogic action was discussed with participants, in a participatory and experimental encounter with data (see Davies, 2014). Discussions with teaching academics served to clarify the purposes underlying teaching strategies, and reflected a methodological approach that assumed knowing and being as plural, co-created, situated, and transactional understandings (Guba & Lincoln, 1994 in Lincoln, Lynham & Guba, 2011).

Data Presentation

The following section uses the four design principles to present descriptions and data relating to the function of

Knowledge Hub's structured lecture theater space. The typology is described, complemented by staff and students comments relating directly to the space's material fixtures and furniture, with observations of practice data. Comments, at times, reflect multiple data collection points: Phase One, conducted in 2013, and Phase Two, conducted in 2015. These serve to illuminate the ways changes may or may not be sustained over time. Staff and student insights, combined with observations indicate how the principles entwined with and functioned in pedagogic practice.

The design of *Knowledge Hub's* interactive lecture theater is comparable to other innovative versions of the archetype in its intent to support a range of teaching modes in a modified adaptation of the one-to-many didactic archetype. As Cal, a teacher who had transitioned from a previous traditional lecturing space to the new lecture theater commented,

> I really love the lecture theater. It's just light. It's just light and it feels airy – not breezy – but airy. And it's aesthetic. And I mean I think that's one of the really good things about moving here. You know, there's a sense of aesthetics around the place. There's sort of light, all those little windows that you can see trees out of (Staff interview #4, 2013)

Seating up to 150 students in a gradual tiered configuration, the four principles of innovative spaces are evident in the layout of the design (see Figure 1).
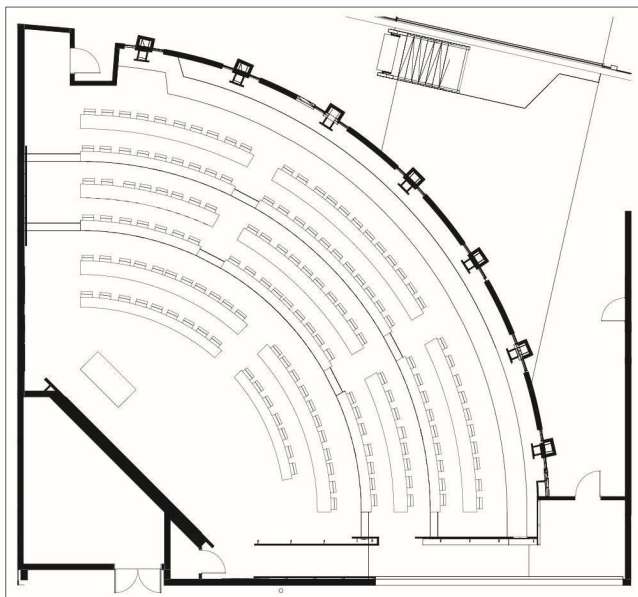

Figure 1. Knowledge Hub **Lecture Hall Floor Plan**

Learner-Centric Lecturing: "We're not just being talked at"

Interview and focus group data spoke to the learner-centered focus of the design, with comments relating to the ways the physical repositioning of students in relation to the teacher functioned in practice. The long-line desks in the space are on a soft, two-tiered incline, rather than in a steep slope as is often seen in traditional lecturing spaces. Tes, reflecting on her teaching experience in the space, felt that:

> The interactive lecture theater's been a really good space to teach in … just having a space that is more conducive to dialogue, that's not a traditional, tiered lecture theater has been really good. It feels a lot more intimate. It's easier to have discussion in there (Staff interview #3, 2013)

Separately, in a student focus group, Lem recounted that:

> a lot of that [collaboration] comes from the fact that there's like, two rows then a layer, then two rows then a layer. You can turn around and talk to the table behind you. Rather than … in [a traditional lecture space] it was just like steep … Whereas we're all on the same level … It really works well
> (Student Focus Group #5, 2013)

For students, this change also resulted in a perceived relational repositioning in student interactions with the lecturer, similarly shifting teaching practice to a more personal, intimate approach, where lecturers and students were (both physically and metaphorically) on the same level.

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As Shi, a student in Focus Group Five, explained, the layout of the lecture theater meant that "you're not looking down on them [lecturers]. You're looking at them. At eye level almost" (Student Focus Group #5, 2013). Also in Focus Group Five, Lea felt "for the lecturer, it's not like, I can imagine in like, [our previous traditional lecture theaters], it's just like this wall of people in front of you. I think it's more, not inti-, I don't know if 'intimate' is the right word, but it's sort of [like that]" (Student Focus Group #5, 2013). Ron commented twice on the impact of the lecture theater levels in practice, stating, "the room feels smaller. It's not like a big, steep lecture theater" and went on to state:

> You feel like you know your lecturer, and you feel that the lecturer knows you, as such. Before, they were at the

front and you were a fair way away from them, looking down on them. Now, it's sort of - you feel, like, level, and it's sort of more of a personal approach. So that, I think, is the advantage of that [in the lecture room] (Student Focus Group #9, 2013)

Similar sentiments were raised separately, with Joh feeling that "It's more student-focused [the pedagogy teachers are using now]. Like, we're not just being talked at. When you're on the same level, you can actually hear what the tutors - the lecturers are saying" (Student Focus Group #8, 2013). Kas similarly suggested "it's more a classroom environment, I would say. Not like, you're the boss and we're the student" (Student Focus Group #2, 2013).

This shift in the pedagogic relationship, connected to the shifted physical positions of staff and students within the lecture theater, seems to align with a view of learning as socially negotiated, where teachers are (re)positioned as facilitators and guides (Dimitriadis & Kamberelis, 2006; Kalanztis, & Cope, 2008; Vygotsky, 1978). From this location, staff work with students in a responsive teaching-learning process, rather than as a boss who directs learning and transmits already constructed knowledge. Carnell (2017) suggests that academic spaces must increasingly offer students "an intimate experience to our pedagogic environment" (Neary & Beetham, 2015, cited in Carnell, 2017, p. 1); relationships with staff appeared pivotal in realizing this within the learning landscape. The room was experienced through an appreciation of the 'fit for purpose' (Souter et al., 2011) way it functioned to facilitate the development of a student-centered learning relationship.

Enabling Connected Lecturing: Untethering Teaching

The provision of ample space between rows reflects the principle of connectivity, as it allows lecturers (and students) possibilities for embodied and fluid movement around the space during group activities while enabling comfort and authenticity in interactions among groups. A focus on *materialities* actively considers spatial dynamics, including embodied *knowings*, and the bodily capacities of inhabitants to wander, learn with others, and move (Mulcahy et al, 2015). The ways the room functions to allow lecturer movement within the theater was a focus in Lee's comments,

I love in the new lecture theater, that when I give them a task, that I can walk around the room in five minutes and have a chat and come back and we're done, you know. So that's wonderful, whereas you can't do that in the [previous theater]. I tried it. It takes ten minutes to go up one side and have a yarn to people and come back down the other. You know, so, it's a better space for that

kind of activity or that connection with others (Staff Interview #6, 2013)

Cal also felt that the ease of movement around the room supported connectivity between students and her as the teacher:

I really love the lecture theater … I think it's more to do with the architecture than with the technology. But I think the fact that you can really walk around … There isn't that student in the middle of the row that you never [interact with]. I think, just the way it is, the opportunities that it gives students, so it really does encourage you to get them to engage with each other more
(Staff Interview #4, 2013)

Students similarly appreciated this new possibility for untethered teaching. Mit felt that "I think that's what the lecturers do really well now in the lecture room. Because [previously] they had to stand at their computer … now they can walk up and walk around … So it's a lot more, yeah, interactive" (Student Focus Group #5, 2013). Another student participant, Esh, commented:

that lecture room is just amazing, the way the lecturers can move around as well. Like, up and down those walls, talking to people … they can move around a lot more than they could before, I think, as well. I think it makes it a lot easier for them … They feel more freedom, I think (Student Focus Group #9, 2013)

Simultaneously, it seemed that free spaces supported staff and students in interacting, providing possibilities for conferencing, cooperative work and peer-to-peer connection, enacting an ideal vision of learning spaces, where teachers act as consultants, coaches or guides to learning (Hunkins, 1994 cited in Childs & Wagner, 2012). This cultural shift is essential to the enactment of learner-centered processes (Adedokun et al, 2017).

Flexible Lecturing Approaches

The flexibility of the interactive lecture theater in sustaining a range of teaching modes, approaches, and strategies is represented through quantitative data collected during room observations. Three teaching academics were observed during four enacted learning situations. Observations revealed that while a didactic approach to teaching remained dominant in the lecture theater with 48.6% of teaching time being recorded in this mode (see, Table 2), this was interspersed regularly with active, discursive, and, less frequently, reflective modes. Although

a small sample, the data is indicative that flexibly enacting student-centered teaching across a range of modes is supported and encouraged in practice by the spatial typology, technologies, and material elements (see, Figures 2 & 3).
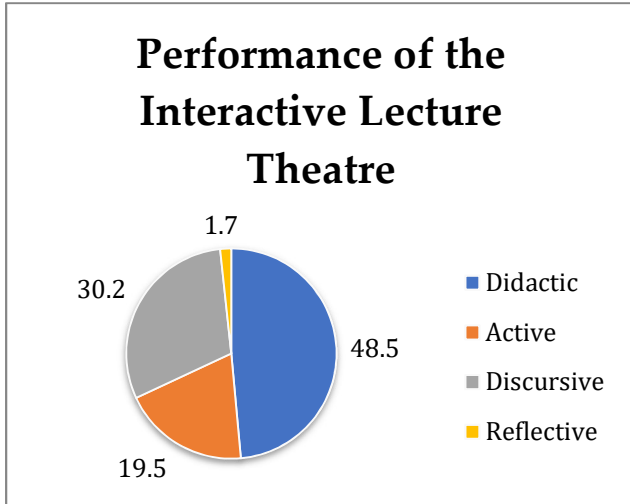

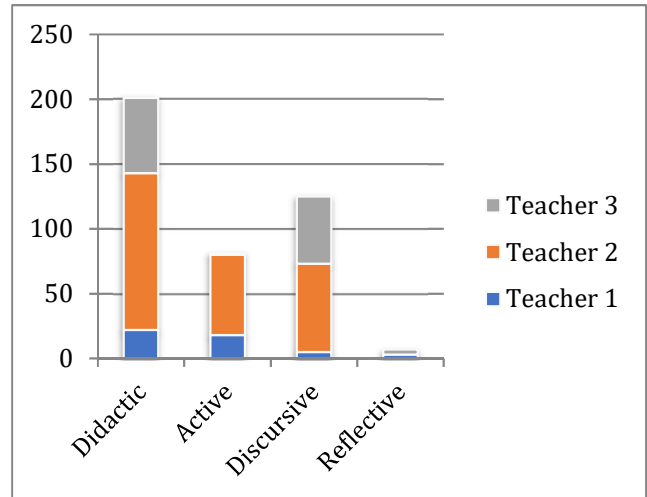*Figure 2.* **Performance of the Interactive Lecture Theatre**

Figure 3. **Performance of the Interactive Lecture Theatre**

Table 2: **Teaching Modes performed in the Lecture Theatre**

	Minutes Observed	Didactic	Active	Discursive	Reflective
Teaching Situation 1, Teacher 1	48 min	22 min (45.8%)	18 min (37.5%)	5 min (10.4%)	3 min (6.3%)
Teaching Situation 2, Teacher 2	184 min	72 min (39%)	62 min (34%)	50 min (27%)	0 min (0%)
Teaching Situation 3, Teacher 2	67 min	49 min (73%)	0 min (0%)	18 min (27%)	0 min (0%)
Teaching Situation 4, Teacher 3	115 min	58 min (50.4%)	1 min (0.8%)	52 min (45.4%)	4 min (3.4%)
Total	414 min	201 min (48.6%)	81 min (19.5%)	125 min (30.2%)	7 min (1.7%)

In the collaborative lecture theater, a space traditionally designed to function in the didactic teaching mode, around half of the time was spent on activities that were active, discursive or reflective. Perhaps in contrast with a view of didactic teaching as a passive activity for students, teaching in this mode aimed to engage students in fundamental conceptual explanations and applications, with teacher questioning, visual aids, modeling, and demonstrative examples of the strategies employed in the didactic mode in the room. In the active mode, examples of enacted strategies included collaborative brainstorming based on a scenario, viewing multimodal texts, and engaging with an expert panel discussion. Matching concepts with descriptions with an emphasis on verbally justifying their choices with peers, developing a collaborative case study to demonstrate knowledge of the main impacts of a concept, and the use and completion of a WWWH – What, When, Where, How – graphic organizer to structure information were learning situations observed in a *discursive* mode of teaching. *Reflective* strategies provided time to compile a personal KWL Chart – what do I *Know*, what do I *Want* to know, what did I *Learn*. This chart then became a reflective 'touchstone' that was returned to throughout the session to encourage deep and personal thinking. Another teacher asked students to create a personal representation, either drawing, concept mapping, or describing in their own words an idea learned in class as a reflective activity to summarize their learning for that session.

While a comparison cannot be made to pedagogic modes performed in the lecture halls used prior to *Knowledge Hub's* completion, 21 of the 36 student participants in 2013 indicated that learning was more collaborative and interactive in class since the transition to the new learning space. In 2015 however only four of the eleven student participants identified this as a sustained change. This complicates the assumption that spaces are automatically 'revolutionary' to practice. In contrast, it reflects the understanding that changes in action are more likely to be iterative and ongoing, with practices modified, adapted, and renewed, often with previous and new practice co-existing (Souter et al, 2011).

Technological Affordances for Innovative Lecturing

Multiple action possibilities or inherent affordances (Keppell, & Riddle 2012; Souter et al., 2011; Steel, & Andrews 2012) are identifiable in the blend of technological infrastructure incorporated in the lecture space in *Knowledge Hub*. A lectern with a personal computer connected to a projector with central display screens, a document camera and microphone, supports visual presentations that enabled a range of modalities. In observations, the lectern computer and projector were the most consistently used technological

affordances in the room, with a total of 399 minutes of recorded teaching time using these display capabilities, although these were not always actively referred to. All episodes made use of PowerPoint to visually and didactically present key concepts, clarify expectations and present requirements of tasks, but also to actively and discursively incorporate video clips, transcripts, and websites. In comparison, the document camera was used for six of the 414 observed minutes to display a diagram from a textbook, aiding the explanation of a concept. This complicated Laurillard et al.'s (2009, cited in Keppell, Suddaby, & Hard, 2011) view that digital media have inherent educational value. Technology alone does not automatically enhance learning. To be most effective, its use must move beyond replication of traditional activities (JISC, 2006; Kirkwood & Price, 2013; Wesch, 2011).

Fittings in the space guarantee access to power at each table for each student, affording the option to 'Bring Your Own Device' (BYOD) to class, a rapidly increasing tendency among students (Dane, 2015). This aims to enhance and increase student participation in class through access to Wi-Fi and an application that allows up to four students to ask their teacher questions electronically. A student participant, Bes, appreciated this affordance, stating:

> I find I do bring my laptop a lot more. Especially to lectures and things, 'cause you do have the power points. Like everyone's got a power point now. And so it's kind of like, there's the facilities there to be able to, and they encourage technology use (Student Focus Group #1, 2013)

Another said the Wi-Fi capabilities and power affordances to support BYOD in the building had enabled him to be "virtually paperless" (Student Focus Group #5, 2013) in his studies. However, the assumption that this extends to the incorporation of technologies in innovative and participatory teaching situations was problematized in staff comments.

As Tes recounted, while "quite a few of them bring laptops" many students did not, and this meant "you've got this disparity then and it'd be good to plan for using the technology not just them use it as a personal learning tool" (Staff Interview #3, 2013). Rod was emphatic about not just the inequity that BYOD created but also the assumption that devices could increase participation, particularly given his belief that education as a discipline area was one that required effective verbal communication to be practiced:

> I think it's unethical to be differentiating between students on a basis of what technology they actually have. And if this [incorporation of devices in teaching]

is to foster interaction, I want to talk to them! I want them to talk to each other. I mean we're talking about teaching (Staff Interview #9, 2013)

Rod's comments demonstrate the way that teachers' beliefs, philosophies, and theories of learning, while an often intangible aspect of teaching practice, deeply inform their enactment of the lecture theater and other learning spaces (Biggs, 2003; Steel & Andrews, 2012). Similarly reflecting a teaching philosophy that valued equity, Tes also felt that because the uptake of BYOD for learning was not uniform. Combined with "the fact that students still have to … engage with the technology, in sometimes clumsy ways … the Wi-Fi can be a problem sometimes" (Staff Interview #4, 2013), she felt that this affordance had little impact on her teaching. She described that for her, in relation to her teaching purposes "in an ideal world" every student would have a device in front of them so "you didn't have to rely on the B.Y.O." Observations in Phase Two showed that making use of this affordance remained sporadic, with between 34% and 60% of students (with an average of 50%) bringing either a laptop or tablet device to lectures.

The understanding that technology use should not be given priority over verbal discourse in teaching and learning contexts was not unique to staff. In Phase One, Bes commented that:

> we'd be working in groups and [staff would] say "Type your responses on your laptop and then we'll put them on the screen. So they'd just switch it to your computer so everyone could see it. Yeah. But sometimes, I think, "Oh, we could've just discussed this. We don't have to type them." Like sometimes I think they're kind of like, "Oh, the technology's there we'll just use it," even though there might have been a better way, verbally to do it
> (Student Focus Group #1, 2013)

Two years later, Mel's statement also reflected that better ways did not necessarily equate to technology use to mediate in-class communication: "We're teachers, we need to be able to talk to people. I feel like [using technology to ask silent questions] really defeats the purpose of being a teacher, not sharing ideas, not verbalising things" (Student Focus Group #3, 2015). Lee's comments also suggested that BYOD did not automatically equate with enhanced participation or in-class engagement:

> Students can bring their devices into the space, and for good or bad, use them to connect *or disconnect* … that's evident when you have a squiz [a look] on any of their windows as you walk past a lecture room - they're not

looking at the lecture notes. But that's the freedom that we give them, and *that's essential for their own growth and their own decision-making*
(Staff Interview #8, 2015, emphasis added)

It seems that for this group of staff and students, there is great diversity in how digital affordances are enacted in practice, a finding consistent with Kennedy et al.'s (2009) study. Digital technologies participate in knowledge practices in ways that reflect the values, purposes, and beliefs of the inhabitants, but also the concealed agencies of the technologies themselves. These can invite and condone practices beyond an imaginary of active, participatory education (internet browsing beyond the lecture notes) or discourage enactment altogether (be clumsy to use or contrary to the underlying educational purposes). It seems that to be pedagogically effective, technologies must be enacted easily, in ways that align meaningfully with learning outcomes and the development of professional competences.

Conclusion

Through four principles of spatial design – learner-centricity, connectivity, flexibility, and affordances - the study shows *Knowledge Hub's* lecture space and enacted teaching practice as an interconnected assemblage. While not generalizable due to the singular, localized case study design, the research findings include that the new soft-slope design of the theater was perceived to enable a shifted, more intimate relationship between staff and students, where students were no longer talked at and the teacher did not act as a boss. While the physicality of the space was an active contributor in this change, it was entwined with and complemented by staff willingness to enact a diverse pedagogical repertoire of strategies across four teaching modes. This in turn untethered their teaching, allowing teaching academics to move around the space to conference with students, further repositioning them as guides to learning, as is inherent and powerful in socio-constructivist pedagogical approaches (Adedokun et al, 2017; Carnell, 2017). In particular, staff commitment to enacting technologies for learning in equitable and purposeful ways, responsive to the necessary competences students require for effective practice in their future disciplinary careers, embodied a student-centered approach to teaching. Staff and student responses to digital technologies complicated the assumption that technology automatically enhances pedagogic practice.

To conclude, the study illustrates that teaching and learning practice is a complex of spaces, technologies, people, embodied onto-epistemologies, and design intent. These coalesce purposefully in pedagogic performance.

Although spatial change is often premised on assuring dynamic teaching and learning, it seems staff competences across a range of teaching modes and strategies are integral to the enactment of these approaches; space itself cannot materialize innovative teaching-learning in practice (Boddington & Boys, 2011). As has been argued elsewhere, space is never entirely or neatly aligned with its intended purposes (Boys, 2011) and inhabitants work strategically and meaningfully *with* material and technological capabilities according to their purposes and requirements (Grellier, 2013; LeFebvre, 1991). In this case, it seemed that staff and students enacted space and technologies selectively, reflectively, and often critically in ways that that aligned with their valued philosophies of practice.

Acknowledgements

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Appendices

Appendix A

Teaching Methods																
	5 minutes				10 minutes				15 minutes				20 minutes			
Didactic																
Active																
Discursive																
Reflective																
Lecturer Tools:																
Lectern PC																
Laptop																
Doc Cam																
Room Cam																
Other																
Student Tools:																
Laptop																
Tablet PC																
LCD Screen																
Whiteboard																
Other																

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Appendix B

Pedagogic Mode	Teaching Strategy Examples
Didactic	• Lecture (Biggs, 2003; Biggs & Tang, 2011) • Giving instructions • Modelling • Demonstration • Teacher think-aloud • Conceptual explanations
Active	• Interactive Lecture • Concept Maps • Brainstorming (Biggs, 2003) • Jigsaw strategy (Biggs, 2003; Biggs & Tang, 2011) • Problem Solving (Biggs, 2003; Biggs & Tang, 2011) • Graphic Organisers (organizing or consolidating information) • Conducting experiments • Developing models of concepts • Expert panel discussion • Collaborative brainstorming • Scenarios • Viewing multimodal texts
Discursive	• Jigsaw strategy (Biggs, 2003) • Reciprocal Questioning (Biggs, 2003; Biggs & Tang, 2011) • Intensive debate (Biggs, 2003) • Group discussion • Think-Pair-Share • Yarning/dialogue circle • 5Ws + H (What, Where, When, Why, How) • Graphic Organisers (justifying) • Verbal justification of conclusions • Collaborative case study development • Student think-aloud
Reflective	• Concept Maps • Note Taking (Biggs, 2003; Biggs & Tang, 2011) • KWL chart (What do I Know, what do I Want to know, what did I Learn) • Graphic Organisers (summarizing) • Personal representation (drawing, concept map, or describe in own words)