In the right space: exploring the dynamics between design, environment and pedagogy

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The environments that we inhabit shape our everyday lives, influencing our behaviors and responses (Manu, 2013). As we enter an immersive phase of education in which physical and digital environments become inseparable, should we reconsider the role and importance of design on pedagogical practice? This paper explores the reciprocal cause and effect of space, technology and pedagogy in shaping the design of educational experiences within Queensland University of Technology's collaborative learning spaces.

Keywords: design, space, learning, environments, collaborative learning, technology, pedagogy

Environmental factors

Learning environments are changing in recognition of the fact that the world is different, information is readily accessible and students have new expectations. For example:

> Today's students are used to and expect continuous connection to information and people. Forcing them to put their personal technology away during class contradicts the way they live their lives (Baepler, 2014, p. 9).

This connected culture in which the internet becomes like the air we breathe is rapidly changing both our society and social norms. From the invention of the World Wide Web 25 years ago (Berners, 1989) the convergence of physical and digital environments has become a tangible reality. Design can have a powerful influence on human behaviors creating 'behavior spaces' (Manu, 2013). The effect of this can be illustrated in how smartphones, airports, supermarkets and online shopping sites such as Amazon are designed to modify our behaviors, ranging from pedestrian flow to purchasing habits. In the same way, educational learning spaces can be designed to positively influence the behaviors of the students and teachers (Whiteside, Brooks & Walker, 2010) and classroom activities (Brooks, 2012). Furthermore, student learning seems to improve when instructors adapt their teaching to the space by "intentionally incorporating more active, student-centered teaching techniques" (Walker, Brooks & Baepler, 2011). The learning needs to be active to facilitate interactions while working on interesting tasks (Beichner, 2014). When combined with advances in our understanding of learning cognition (Rayner, Cools, 2012) the opportunity for educational learning environments to enhance the student learning experience goes beyond existing perceptions.

Educational institutions across the world are exploring to new ways to engage students in what is increasingly becoming a global market. The design of new learning environments, both physical and virtual, provides a key opportunity in shaping the future of learning. These factors have influenced the design of new collaborative learning spaces at Queensland University of Technology (QUT) which are underpinned by problem based learning (PBL) (Hmelo-Silver, 2004) and collaborative learning (Lee & Smagorinsky, 2000) as response to the changing demands within traditional learning frameworks. These spaces formed a central theme within a $230 million Science and Engineering Centre that opened at QUT in 2013. The design process embraced a co-creation approach engaging university academics, professional staff and architects, in response to the dynamic interplay between the learning frameworks (Evans, Matthew, 2012).

The design of the collaborative learning spaces evolved through the development of a prototype space in 2011 that housed a range of furniture and technologies in which to explore their practical affordances. These explorations used established theories as a starting point to advance our understanding in the dynamic between design, environment, pedagogy and technology. By balancing practical requirements, theory and emerging practice, a design was achieved that provided space, furniture and flexibility for group sizes of 6 students. Findings that emerged during this prototype phase informed the design of a 'base configuration' for furniture and

technology that supported novice users, and evolved into a design template for future collaborative spaces. This design template included a computer on wheels (COW) for each student group, which was a large touch sensitive screen attached to computer, the space also included a lectern, projector, document camera and recording equipment. In parallel with the design and development of the learning spaces a professional learning program called 'Learning and Teaching in Collaborative Environments' (LATICE) supported the pedagogical transition to more active and collaborative forms of learning and teaching. One of the main aims of the LATICE project has been to develop strategies to integrate a range of scalable, transformative and sustainable models for learning and teaching in new physical and virtual spaces, while strategically aligning with university goals. Since 2010 a number of professional learning opportunities for staff have been implemented including:

- induction workshops;
- designing for collaborative learning workshops;
- learning networks;
- faculty focused workshops;
- symposium (2013); and
- 'Making Connections' annual learning and teaching showcase.

Design, environment and pedagogy

Academic staff were invited to complete a survey in the final weeks of Semester 1, 2014, about their experience of teaching in a collaborative learning space during the semester. This also coincided with students being surveyed but the resulting data is not presented in this paper. Of the 180 staff teaching in 89 units in these spaces, 31 responded who taught in a total of 40 units (i.e. some taught in multiple units). The types of assessment tasks for these 40 units are summarised in Table 1. Survey responses were both quantitative and qualitative with the latter being thematically analysed to identify underlying trends.

Table 1. Assessment features of 40 units

	No. of units
Group assessment	21 (52.5%)
Examination	16 (40%)
Both group assessment and examination	11 (27.5%)

Findings from the evaluation of these collaborative learning spaces are indicating a positive influence on pedagogical and technological proficiency. Staff were asked to rate their level of proficiency of the tasks shown in Table 2.

Table 2. Proficiency Levels

Task	Poor	Below Average	Average	Above Average	Excellent
Designing learning activities	0%	3%	39%	39%	19%
Determining the appropriate pedagogy for a learning activity	0%	6%	48%	23%	23%
Determining the appropriate technology for a learning activity	0%	13%	42%	35%	10%

The findings show that 46% of staff using these collaborative learning spaces felt their proficiency level was above average or higher for determining the appropriate pedagogy for a learning activity and 45% indicate their level of proficiency in determining the appropriate technology for a learning activity was above average or

higher. These findings begin to build an interesting picture when correlated with the number of staff who responded to the survey question relating to staff development in Table 3.

Table 3. Staff development

	Collaborative learning induction	Design for collaborative learning	Other	None
What type of collaborative learning staff development sessions have you attended?	7 responses (23%)	5 responses (16%)	5 responses (16%)	21 responses (68%)

It is useful to note that in Table 3 the question did not refer to a specific timeframe (i.e. Semester 1, 2014), and that the respondents to this staff development question were able to select more than one option. From the 31 staff surveyed, 68% had not participated in any staff development, which poses an interesting possibility: Are the collaborative learning spaces influencing the academic pedagogical and technological proficiency levels without the need for staff development? If this is the case, is being 'in the right space' providing a catalyst for pedagogical change? In response to designing learning activities, 58% indicated their proficiency level was above average or higher and if we combine these results with the average, 97% of staff see themselves as being average or above in designing learning activities for the collaborative learning space. We also see that 94% of staff state they are average or above in determining the appropriate pedagogy for a learning activity and 87% of staff are average or above in determining the appropriate technology for a learning activity. Given such a significant proportion feel they are capable of design activities and of determining both the appropriate pedagogy and technology, is the design of the space (learning environment) the factor that has been overlooked in addressing the ongoing questions for scalable and sustainable staff development approaches?

Discussion

The survey results suggest that although only a small minority of staff had participated in staff development sessions that could benefit their teaching, the majority seem confident in their ability to take advantage of the affordances of teaching in a collaborative learning space. In other words, certain characteristics of the space may shape teaching practices and classroom activities in beneficial ways (Brooks, 2012) as well as the professional learning that staff undertake. Staff responding to this survey had a minimum of one semester's teaching experience in this type of learning space, while others were more experienced, having used these spaces for a longer period of time. It is acknowledged that some selection bias maybe reflected in this study with only 31 respondents and that further research is required.

Does the space make teaching beliefs and approaches more explicit? Such reflection is beneficial for exploring good practice (Steel & Andrews, 2012). Teaching philosophy and the type of learning space (i.e. traditional versus active) appears to influences instructional practices (Sawers et. al., 2013). This presents a number of interesting questions; if space is the change agent, the driver for change in proficiency levels, what is the minimum duration or immersion within these types of collaborative spaces to positively influence pedagogical and technological proficiency? It is acknowledged that further research is required to understand what these finding mean in respect of fully online and more informal learning environments. For example; can the design of a fully digital (Online) learning environment have similar influence on pedagogical practice? What is well understood by the Educause Centre for Analysis and Research (ECAR) 2013 survey that collected responses from approximately 112,000 undergraduate students from more than 250 higher education institutions about their technology experiences and expectations is that:

> students prefer blended learning environments that consist of some face-to-face contact with academic staff and peers as well opportunities to interact online that take advantage of suitable technologies for collaboration and communication (Dahlstrom, Walker & Dziuban, 2013).

This means that there is a clear need to continue to investigate ways to make face-to-face learning active in order to produce enhanced learning experiences (Whiteside, 2014) and perhaps by asking what minimal interventions would have the greatest impact in the developing effective pedagogical and technological capabilities, we may enable new ways of thinking about how we design learning experiences.

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