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Space matters – particularly when you don't have a lot!

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Most Australian universities have invested in recent years in learning space developments designed to enhance the student experience and to support more active and collaborative pedagogies. The reality for most students is that their student experience is formulated in teaching spaces (lecture theatres, general purpose teaching spaces, specialised laboratories) which were designed for pedagogies that were considered innovative and relevant for industrial times, rather than the rapidly advancing technological age of the twenty first century and beyond. Retrofitting the twentieth century classrooms that form the majority of learning spaces in most Australian universities for twenty-first century learners will be quite a challenge for Australian universities in the coming years. Particularly when these learners are generally more IT savvy than previous generations of students, and often own and are familiar with more sophisticated technologies than those either available or permitted in their university. This paper discusses the context of an Australian Learning and Teaching Council Priority grant focused on retrofitting, redeveloping and updating the university teaching spaces of the twentieth century. One of the outcomes of this project will be a set of design principles informed by the available literature focusing on space, technology and pedagogy issues will be developed and the authors will utilise these principles to guide and inform the redevelopment process of three learning spaces at three Australian universities throughout 2009/2010.

Keywords: learning space design, active learning, student engagement

As a number of authors (Scott-Weber, 2004) have highlighted using a quote from Winston Churchill “We shape our buildings; thereafter they shape us” – space matters! Space matters, it has been argued, because the physical environment influences our behaviours. The Commission for Architecture and the Built Environment (CABE) in the UK in its report “Design with Distinction” (CABE, 2005) highlights that space design has an influence on a number of key performance indicators for higher education institutions including:

- **recruitment:** a positive influence on a student's decision to study in a higher education institution (especially true for post-graduate students);
- **retention:** a positive influence on the way a student feels and behaves while they are studying, including their decision to continue studying at that institution; and

- **performance:** a positive influence on student's motivation, facilitating creativity and inspiration and facilitating key elements of course content.

While the evidence that space matters is becoming increasingly clear, the reality for most students is that their formal learning activities, and therefore their student experience, occurs in rooms which have their origins in the traditional didactic mode of instruction with little or no support for new pedagogical approaches. Developed when the predominant pedagogical view was framed around “the lecture, the book, and marked assignment” (Laurillard, 2002), these spaces have changed little in the past few decades. Based on the evidence that ‘Space Matters’, a learning experience that occurs in this type of space is unlikely to be perceived as being a positive one and, more importantly, it is likely to have, at some level, impeded the achievement of desired learning outcomes.

With the rise of the internet, and the arrival of the net generation (Brown, 2005; Oblinger & Oblinger, 2005) students are more technology savvy than ever before, owning and using a wide range of emerging technologies (Oliver & Goerke, 2007). In response to students' needs, and sometimes demands, many universities, have focussed on improving traditional learning spaces by improving the lighting and furniture and introducing technology designed to increase the richness of materials presented in the classroom. Lecture theatres and tutorial rooms have typically been upgraded to include computer and associated projection facilities, enhanced with internet connectivity and, more recently, provisioned with wireless. The degree to which this type of improvement has become a key tenant to most universities' strategy for improving learning spaces can be seen in its adoption as part of key university and sector measures for support of teaching and learning (see, for example, CAUDIT EDUCAUSE annual benchmarks; CAUDIT, 2005).

While the provision of technology has arguably resulted in some improvement, the general observation can be made that current methods of technology provisioning result in the reinforcement of a didactic approach rather than facilitating more constructivist approaches to teaching and learning. Twigg (2005) suggests that most universities have simply bolted new technologies onto an existing set of physical facilities, maintaining the current concepts of transmission style classroom instruction.

As a result, attention has turned to the need to redevelop the broader range of learning spaces to support more collaborative, participative and often social forms of learning. In recent years, a number of articles and reports have presented a range of design principles for this ‘next generation’ of learning spaces (Jamieson et al., 2000; Long & Ehrmann, 2005; Oblinger 2006). Table 1 provides a list of some of the design principles regularly quoted in higher education contexts.

These principles present a range of challenges including: designing for people and learning, not technology; supporting a range of different pedagogical approaches; being creative and bold and looking beyond present demands; planning for technologies brought into the space now and in the future; and allowing for greater levels of learner control of spaces. Based around these principles, many universities have developed new and innovative learning spaces designed to support a range of existing and emerging approaches to active, collaborative and participative learning. Melbourne University's Chemistry Wing, and the University of Queensland's Collaborative and Teaching and Learning Centres (CTLTC) are two examples (Carrick, 2007).

Table 1: Summary of popular design principles for active learning spaces

Jamieson et al. (2000): Place and space in the design of new learning environments
• ensure multiple use concurrently and consecutively • maximise the inherent flexibility within each space • make use of the vertical dimension of facilities • integrate previously discrete campus functions • maximise teacher and student control • maximise alignment of different curricula activities • maximise student access/use/ownership of learning environments
Long and Ehrmann (2005): Future of the learning space
• optimised for learning activities; not just stuffed with technology • enabling technologies brought into rather than built into the space • invisible technology & flexible use • emphasize soft spaces • useful across the 24hr day • zone for sound and activity
Johnson and Lomas (2005): Design of the learning space: learning & design principles
• innovation and excellence • adaptability • manageability • accessibility • atmosphere • sustainability
Oblinger (2006): Learning spaces
• design learning spaces around people • support multiple types of learning activities • enable connections, inside and outside • accommodate information technology • design for comfort, safety and functionality • reflect institutional values
Higher Research Funding Council for England (2006): Designing spaces for effective learning
• flexible: to accommodate current and evolving pedagogies • future proofed: to enable space to be re-allocated and reconfigured • bold: to look beyond tried and tested technologies and pedagogies • creative: to energise and inspire learners and tutors • supportive: to develop the potential of all learners • enterprising: to make each space capable of supporting different purposes
Bergsagel et al. (2007): Architecture for achievement
• personalised: supports more individualised approaches to learning • learning focused: supporting challenging and engaging curriculum • collaborative: supports students working together to solve problems • community connected: breaks down barriers to involvement • adaptable and flexible: allows for a changing world

The inherent complexity of the learning/learner, space and technology means that any design must move from one of ‘getting it right’ to considerations of ‘future proofing’ based on the notion that “we cannot anticipate future technological or pedagogic developments but ensure that designs will accommodate change” (HEFCE, 2006). As Long & Ehrmann, (2005) suggest, investment in learning spaces should not be seen as a “once off” project but rather one of continual evolution where the building designed today will change electrical infrastructure once, furniture at least twice, and software systems fifteen times or more over the life of the space. Add to this mix, student provisioned technology and the rate of technology refresh increases dramatically.

Another challenge for many universities is the practical reality that, despite the best intentions, the competing space demands of the institution (teaching, research, office,

common use, operational, etc.) mean that space for new development is often not readily available and the opportunities to develop spaces dedicated to specific activities such as collaborative learning are limited. Equally challenging is the complex nature of the student population at most universities. Despite the increased attention received by the ‘net generation’ (Carlson, 2005; Oblinger & Oblinger, 2005; Oliver & Goerke, 2007), the reality is that student comfort, familiarity and access to technology varies widely across the student population. As Kennedy et al. (2008) conclude, educators must remain ever vigilant to the changing and diverse nature of their student populations.

To guide the development of effective learning spaces there is a need for a set of principles that moves from the general to the specific, starting from a focus on the learner/learning (Long & Ehrmann, 2005; Oblinger, 2006; Bergsagel, Best et al., 2007) through to a consideration of the practical elements of ongoing space management. Starting with Chickering and Gamson’s “Seven Principles” (Chickering & Gamson, 1987) a range of learning principles have been presented in the last few years (American Association for Higher Education, American College Personnel Association et al. 1998; Bransford, Brown et al. 2000; Carmean and Haefner 2002). Scott-Webber (Scott-Webber 2004) suggests that principles like those developed by the American Association for Higher Education and others (American Association for Higher Education, American College Personnel Association et al., 1998) help us put learning and knowledge sharing in context. If we take these principles as an empirically grounded starting point we can extract the general implications and then translate these into learning space design guidelines as in Table 2.

Table 2: Mapping learning principles to learning space design guidelines

Learning principles:	Learning space implication	General space/technology guidelines
1 <i>Learning is about making and maintaining connections</i>	<i>Learning spaces should make it easy for students to access relevant resources and learning materials.</i> <i>Learning spaces should support easy interaction between students and with academics.</i>	• Spaces should be equipped with wireless connectivity to allow staff and students to easily access digital resources, learning management systems and learning materials repositories. • Technology in the space should allow materials to be easily displayed and shared. • A combination of institution-provisioned technology and applications, student-provisioned technology and open-source applications should be supported that encourage student collaboration, brainstorming and decision making.
2 <i>Learning is enhanced by taking place in the context of a compelling situation</i>	<i>Learning spaces should help create a sense of stimulation and excitement.</i> <i>Learning spaces should reflect the values of the institution.</i>	• Spaces should utilise elements such as colour and art works to encourage creativity and a sense of excitement. • Spaces should provide opportunities to display material from students, academics and the professions designed to set expectations, challenge and encourage student learning. • Space should be flexible enough to support a variety of related activities and pedagogical uses without any need to reconfigure it from use to use.
3 <i>Learning is an active search for</i>	<i>Learning spaces should support student</i>	• Spaces should support both academic-directed and student-led learning activities

Learning principles:	Learning space implication	General space/technology guidelines
meaning by the learner	construction of knowledge. <i>Learning spaces should support active engagement rather than passive receipt of knowledge.</i>	• Spaces should avoid reinforcing academic control of the learning activity, i.e. space and technology should not give pre-eminence to the 'front' of the room. • Furniture and technology should be robust and light enough to be easily moved around the learning space. • Technology should be utilised to allow students to easily interact with classroom activities and each other.
4 Learning is developmental, a cumulative process, integrating new with the old	<i>Learning spaces should make it easy for students to build from previous knowledge.</i> <i>Learning spaces should make it easy for students to share knowledge.</i>	• Students should be able to easily access previous learning materials or personal outcomes from the learning management system, personal learning environments or e-portfolio systems • Students should be able to access tools that allow them to easily re-task learning material, annotate it, re-edit it or incorporate it into new resources. • Technology should facilitate easy sharing of materials, resources and ideas both within teams as well as across the class.
5 Learning is done by individuals who are intrinsically tied to others as social beings	<i>Learning spaces should be flexible enough to support both individual and group activities.</i> <i>Learning spaces should allow students and academics to connect to the broader community outside the university.</i>	• The spatial configuration of the room should be exploited to facilitate team collaboration zones as well as individual reflection nooks. • Spaces need to make it easy for students to be able to hear what academics and other students say and see what other people share. • Technology in learning spaces should make it easy for students to connect with the world beyond the classroom and easily bring relevant resources (materials and people) back to use as part of their learning activities.
6 Learning is strongly affected by the educational context in which it takes place	<i>Learning spaces should be safe, comfortable and free from external distractions.</i> <i>Learning spaces should assist learners to be an active part of the university community.</i>	• Spaces should be inviting and welcoming with comfortable furnishings, plenty of natural and variable light, good ventilation, good acoustic treatment and well maintained. • The technology systems must be simply to use, reliable and supportable by technical personnel so that problems do not distract students or academics from the task at hand. • The design elements of the space (colour, furnishings, etc.) should convey some sense of the institution's values. • The design elements of the space (colour, furnishings, etc.) should provide the user with some sense of connectivity or sense of place across the institution.
7 Learning requires frequent feedback if it is to be sustained, practice if it is to be	<i>Learning spaces should facilitate academics in monitoring and engaging students in</i>	• Spaces should avoid design elements such as fixed podiums that reinforce artificial separation of academics and students and utilise wireless and mobile technology to allow academics to have full

Learning principles:	Learning space implication	General space/technology guidelines
nourished, and opportunities to use what has been learned	their learning. <i>Learning spaces should facilitate academics providing feedback on student activity.</i>	control of the room while on the move. Technologies should support academics and other students providing comment, critique and feedback on any student or student group work.
8 Much learning takes place informally and incidentally	<i>Learning spaces should cluster formal and informal spaces to support easy transition.</i> <i>Learning spaces should support opportunities for accidental or serendipitous interaction between students and academics.</i>	- Adjacent corridors, outdoor areas and entrance ways should be designed to support break out spaces or impromptu pre- and post-lesson learning sessions. - Simple technologies such as mobile whiteboards or writeable surfaces should be utilised to allow students and student groups to break out of formal classrooms to engage in team work.
9 Learning is grounded in particular contexts and individual experiences	<i>Learning spaces should be cognisant of cultural requirements and celebrate diversity.</i> <i>Learning spaces should assist the connection of the university as a broader community of learners.</i>	- Signage, art work and other materials in learning spaces need to be cognisant of different cultural considerations and emphasise positive rather than negative behaviours. - The location, construction and fitout of learning spaces need to be based on a conscious consideration of access to relevant cultural requirements. - Notice boards, display cabinets and the like should be utilised in common spaces to help students share their work in ways that the broader university community can be engaged beyond their own discipline.
10 Learning involves the ability of learners to monitor their own learning	<i>Learning spaces should allow students to capture learning outcomes for latter review.</i> <i>Learning spaces should help draw out reticent students.</i>	- Technology should be available to capture classroom activities allowing easy play back and review by students at any time. - Capture facilities should allow students to record their learning outcomes for upload to PLE or e-portfolio systems. - Interactive facilities in learning spaces need to cater for anonymous or identity neutral engagement.

In conclusion, if we are truly to use the affordances of good learning space design to positively impact the student experience we need to: develop solutions that can be implemented more broadly, develop solutions that can be implemented in a sustainable manner and develop solutions that can evolve as demands change. Most importantly, we need to develop solutions that are firmly grounded in the domain of learning and learners. This allows us to continually focus on the student learning experience, and the motivation and opportunity to do something that positively impacts on it.

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