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Draft report

PLACES & SPACES FOR LEARNING SEMINARS

September 2007

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PLACES AND SPACES FOR LEARNING SEMINAR SERIES

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This is a draft text of the final report. The final version will include copies of slides from the presentations. We are releasing this draft as a resource for those preparing applications for submission to the Priority Projects Program 2008.

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1. INTRODUCTION

The Places and spaces for learning seminars arose out of the decision of the Board of the Carrick Institute to disseminate good practice and deepen understanding of the challenges, and areas of need, regarding the use of learning spaces to enhance learning and teaching in higher education.

Space has become a tangible resource for Australian universities. From the physical to the virtual, the creation and maintenance of space has become a vital task. The question that has become pertinent to our understanding of space within the context of education is how can we approach the design, layout and technological integration to best create an environment optimised for learning.

The Carrick Institute understands the challenges involved. Academics tend to lead lives so focussed on research and teaching, that there is little opportunity to look across the fence to see what their peers are doing. In addition technology advances and become obsolete so quickly. The challenge of ensuring the investment into technology for new learning and teaching spaces can be renewed or replaced, without exorbitant infrastructure costs down the road, cannot be underestimated. Furthermore, even when there is institutional support to create an environment optimised for learning, the redesign of a space often involves people from different departments, with different sets of skills, knowledge and lexicon. Overcoming these challenges to ensure that ideas are shared, technology is harnessed and team members with different specialisations start from common ground is no mean feat.

To support the endeavour of optimising space for teaching and learning, the Carrick Institute provided universities' staff and others with the opportunity to attend and contribute to a series of events between 17 - 28 September 2007 to identify, consolidate and disseminate good practice in the refurbishment and development of innovative learning and teaching environments.

The fortnight of events included a series of seminars around Australia, an intensive environment design workshop and university visits. These events provided opportunities for the sector to start dialogue and contribute to the planning, development and use of learning spaces.

The backbone of the fortnight was the series of seminars around Australia. The Carrick Institute hosted full day seminars comprising international and local keynote speakers in Adelaide, Perth, Melbourne, Sydney and Brisbane. Additional speakers addressed key issues and showcased innovative space and practices. This report covers in greater detail the exciting new developments within Australia shared at each seminar. One of which is a project funded by the Carrick Institute titled *Technology in the next generation learning spaces*, covered in under the Section 3, *Places to learn and to teach* of this report.

The Carrick Institute also provided representatives from 17 universities the opportunity to participate in an intensive, hands-on exercise in the design of learning environments. The event was convened by The University of Melbourne in collaboration with RMIT University involving participants from a range of disciplines and positions within their respective institutions in order to experience how to approach the design and development of new learning environments. The final report is available on the Carrick Institute website.

There are many contributors to this report: the speakers themselves, the reporters at the various venues, and those who edited the material and brought together the themes discussed. Contributors are listed below:

Mr Les Watson

Associate Professor Kenn Fisher
Professor Nick Klomp
Professor Daryl Le Grew
Professor Shirley Alexander
Professor Michael Keniger
Professor Geoff Crisp
Professor Mark Bush
Professor Sandra Wills
Professor Richard James
Ms Jo Dane
Associate Professor Peter Jamieson
Mr Derek Powell
Mr Alasdair McClintock
Dr Michael O'Donoghue
Mr Ron Hewitt
Associate Professor Peter Tregloan
Mr Ashley Halliday
Dr Garry Leadbeater
Associate Professor Gordon Sanson
Ms Lynda Wilem
Mr Wayne Reid
Ms Peta Drury
Ms Marion Wilson
Associate Professor Adam McCluskey
Ms Shirley Oakley
Dr Alistair Inglis
Mr Tom Loncaric
Associate Professor Ian Reid
Dr Caroline Walta
Dr Di Challis
Dr Henk Huijser
Dr Kerri-Lee Harris
Ms Julia Gobel
Ms Margaret McCafferty
Ms Jacqui Elson-Green
Ms Wendy Ng
Dr Elizabeth McDonald

2. KEYNOTES

The keynote speakers both national and international provided valuable insights into current issues surrounding the use of learning and teaching spaces to enhance learning and teaching. Mr Les Watson, an international keynote speaker, spoke in all five states. Mr Watson was the Pro Vice-Chancellor (Learning and Information Systems) at Glasgow Caledonian University from 1999 to September 2006. During that time, he led the development of the Learning Café, REAL@Caledonian and the award-winning Saltire Centre. Les' presentation debunked the myth that design decisions should be based on historical data. Instead, for the 21st century learning space to remain relevant, it demands flexibility, plays to diversity, has a social component of creating a sense of community, embeds technology and is, above all, inspirational.

In Adelaide, Associate Professor Kenn Fisher from The University of Melbourne spoke about aligning space, place and learning modalities. Associate Professor Fisher firmly believes that for lasting change to occur, learning spaces must provide an environment utilising current devices used by students but also flexible enough to accommodate those that they are likely to use in the future. Drawing on national and international examples of how pedagogical activities require specific spatial qualities, Kenn argued that the pedagogy of the discipline must influence the design of space.

In Perth, Professor Nick Klomp from Charles Sturt University (CSU) spoke about learning places and head spaces. Professor Klomp argued that good learning spaces are not just about good buildings but good examples of vision. They embrace and balance change and challenge. As CSU refits existing structures to make the institution relevant for the 21st century, the buildings on Albury-Wodonga Campus demonstrate how in the refitting of the old, the design can be cutting-edge and environmentally sensitive. He emphasised that clear goals, use of the best available evidence, risk analysis and ongoing evaluation are the best ways to address the needs of the future.

In Melbourne, Professor Daryl Le Grew from University of Tasmania presented on the place of learning. Professor Le Grew argued that as universities become culturally diverse and face economic pressures, new design models need to be unconventional, collaborative, experiential and sustainable as cultural nuances of students, staff and visitors are negotiated. As universities can no longer rely on the public sector, there is a need to identify new sources of funds through collaborative models with the private sector, nationally and internationally, to be successful in their re-design of existing structures.

In Sydney, Professor Shirley Alexander from University of Technology Sydney (UTS) presented on real and virtual learning space design. Professor Alexander shared how learning spaces are currently reconceptualised in UTS through a framework for thinking about teaching spaces. She argued that the redesign of spaces is driven by students' learning strategies and activities rather than technology and priority is given to technologies which will benefit the majority of students. She also shared how UTS is exploring the possibilities of using immersive technologies such as *Second Life* as virtual spaces to facilitate learning and teaching.

In Brisbane, Professor Michael Keniger from The University of Queensland (UQ) presented on the need to think of places and spaces as a continuum of temporal and physical venues instead of discreet and segmented venues for learning and teaching. In the re-design of space, there is a need for a champion who will be passionate about the learning experiences the space facilitates. Keniger drew attention to various national and international architectural designs, including UQ's Collaborative Teaching and Learning Centre.

2.1 'It's not about us – It's about them'

Mr Les Watson (This report is summarised by Ms Jacqui Elson-Green drawing upon the reports of Associate Professor Ian Reid, Dr Caroline Walta, Dr Di Challis, Dr Kerri-Lee Harris and Dr Henk Huijser.)

Les Watson was Pro Vice-Chancellor (Learning and Information Services) at Glasgow Caledonian University from 1999 to September 2006. During that time, he was responsible for integrating the library, C&IT Services, student services, e-learning, the Caledonian degree and work-based learning into a university-wide learning service. In addition, he led the development of the Learning Café, REAL@Caledonian, and the award-winning Saltire Centre. Les is currently the lead consultant for JISC Infonet project that is producing the 'Developing Technology Rich Spaces for Learning' infokit.

The conceptual foundation

'It's not about us – It's about them', the title chosen by Les Watson for his keynote address at the Places and Spaces Seminars in September 2007, encapsulates his philosophy for creating inspirational learning environments. At each of the seminars around Australia Mr Watson placed emphasis on the importance of creating flexible and student-focused places for on-campus learning as well as the need to support and promote creativity. A prime concern is for universities to provide a sense of 'home' for all students through the careful design of places for informal, social learning.

Delving further into the physical nature of such environments, Mr Watson described the design of the Saltire Centre at Glasgow Caledonian University where he was formerly Pro Vice-Chancellor and project champion for the building. The Saltire Centre illustrates one approach to the transformation of a traditional library into a high profile, multi-purpose place for learning.

The presentation issued a challenge to revisit first principles about learning and to again consider the students' perspective when thinking about the design of the spaces in which teaching and learning takes place, a point noted by Associate Professor Reid, who reported on the seminar held at the University of South Australia.

Mr Watson debunked the view that design decisions should be based on the extrapolation of historical data by claiming that there is no 21st century university paradigm and hence it is not possible to predict current needs by using data from the past. Designing buildings with an inherent capacity for change is preferable because it is not possible to forecast future needs. This view was reinforced with the following quote from Brand (1994): 'All buildings are predictions, all predictions are wrong ... but we can design buildings so that it doesn't matter if they are wrong.'

Central to addressing the future needs of universities is to consider that society is entering a Conceptual Age characterised by creativity and experience. Based on a model developed by Pink (2005), Mr Watson explained that in the Conceptual Age 'what' is less important than 'know how' and 'know why', therefore leading to a characterisation of this period as a Learning Society. Within the creative world view 'the reference point is the future, not the past. We don't need to fall back on the past for our decisions. Choices are based on alignment with our purpose and our vision for a different world' (Land & Jarman, 1992).

Mr Watson argues that it is essential to be more visionary, and to achieve this requires a sound strategy and imagination. Key to this strategy are the following elements: people, technology and environment. People bring structure, skills and abilities; technology needs to be thoughtfully applied and made pervasive; and environments needed to capitalize on design and be configured for purpose. A strategy that provides synergy between these elements – a design that integrates people, technology and the campus environment – is required.

It is important, however, to understand also that students have a different life experience of technology than do many university staff. In taking a student-focused approach to design it is therefore crucial that students' current interaction with technology be investigated. This point was noted by Dr Kerri-Lee Harris who reported on the Sydney seminar and drew out Mr Watson's differentiation of the technology-oriented nature of today's students – the 'digital natives versus digital immigrants' concept put forward by Prensky (2001).

At the Melbourne seminar Mr Watson noted that as we move to a synergy of these elements (towards connectedness cutting across barriers and boundaries and away from isolation) we need to be aware that we have much to learn about applying technology, something that is not being done well at present.

Underlining the importance of vision and imagination, with specific reference to the design of places and spaces for learning, Mr Watson posed a central question: can we use our buildings to change the education system? In Brisbane Dr Henk Huijser observed that Mr Watson suggests this would require vision and imagination in the sense that it requires a certain amount of thinking outside the square and taking risks as well as convincing others that those risks are worth taking or, if others can't be convinced, taking personal responsibility for risk.

Promoting creativity

Mr Watson argues that employers are looking for graduates who are adaptable, self-confident and 'intuitive' yet research reveals that over the course of their formal education, young people rapidly lose their ability to think creatively. Reporting from Melbourne, Dr Di Challis notes that Mr Watson is alarmed that while 98 per cent of three to five-year-olds demonstrate divergent thinking (a measure of creativity) just 2 per cent of those aged 25 and older do so (Land & Jarman, 1992). She also notes his observation that universities talk glibly about the experiential lifestyle which is increasingly being sought and becoming more prevalent in society as experiences replace goods and services because they stimulate creative faculties and enhance our creative capacities (Florida, 2005). Economic value has progressed from the extraction of commodities to the staging of experiences and this is where universities should be headed.

Importance of informal learning

Not only do most students spend the majority of their academic week outside formal classes, but this informal learning time is also critical to developing the skills needed for students to become independent learners. Despite the pervasive influence of ICT on how people – particularly young people – interact, such 'creative class' people still want to have social interactions that involve 'going' to places and 'being with' people. Dr Harris, reporting on the Sydney seminar, comments that Mr Watson's view is that well-designed, informal learning spaces capitalise on this by taking what might otherwise be 'gratuitous socialisation' and putting it to good use. Conversation and social learning are important, but so are opportunities for individual study and quiet thinking. Creative people need time, places and events for play.

Rethinking teaching and learning spaces

Mr Watson argues that dissatisfaction with existing arrangements is a precondition to significant innovation. Given sufficient 'unhappiness' and resources, the next step in reconceptualising spaces should be developing an agreed institutional philosophy for the project. Stressing that learning spaces need to focus on students, not the organisation, Mr Watson contends that the design of university buildings has traditionally given priority to the needs of the institution. An explicit focus on students' needs and experiences is required with the needs of 'all' students taken into account. The diverse communities that now characterise universities is unlikely to change in future, therefore, spaces should be designed to accommodate a diversity of learning needs and preferences.

Meaningful technology

This type of student-centred approach highlights the need to consider the full range of student services and information. Reporting on the Brisbane seminar, Dr Henk Huijser notes Mr Watson's contention that in designing the Saltire Centre, the intention was to create a learning environment that plays to difference including a vision of technology as ubiquitous and embedded. Technology should be available, reliable, beautiful, red hot and relevant. Mr Watson's impression of universities is that they try but stop short of achieving these objectives with excuses such as 'there's not enough bandwidth' and 'it wouldn't work on our system', Dr Di Challis reports from the Melbourne event.

In planning for technology the Saltire Centre attempted to consider a full range of technology and the needs of a broad range of students within the learning space. Decisions were made to have both wireless and wired internet access while recognising that technology is always in flux and good planning incorporates the best of both the old and the new. Paper collections continue to be part of the library with items used infrequently moved from central places and replaced with those in more popular use. Compact shelving allows for more open spaces and seating.

The Saltire Centre

The Saltire Centre aims to be at the heart of the intellectual community and is consequently located at the centre of the campus. Student services, which are central to the life of students, are also located in the building - where students are. Reporting on the Perth seminar Dr Caroline Walta notes Mr Watson's explanation that rather than having these services obscurely located throughout the university, positioning them within the Saltire Centre opens up the possibilities of online and readily accessible services. This fulfils the Centre's design brief to create collaborative and interactive opportunities for learning while providing a variety of learning spaces and delivering student services within an environment of visual happiness.

Neither work, nor home, this Centre becomes a 'third place' which functions as a comfortable venue where people might find good company, food and good conversation. Use of colour, space and lighting are an important design element in providing functionality. Dr Henk Huijser, reporting on the Brisbane seminar, comments on Mr Watson's belief that the Centre's design is a physical representation of the institution's vision and strategy for learning: responsive, inclusive and supportive of attainment by all.

The main design features of the Saltire Centre as summarised by Dr Harris are:

- Different zones, ranging from highly social spaces, to spaces for quiet, individual study. These are located on different levels of the building with the most social on the ground floor. Moving through the building, the progression is toward increasingly quiet study and individual activity. Imagery is used to foster specific types of activities in different zones.

- A place that meets the needs of 'all' students. Within each zone, variety in design creates a diversity of 'micro-spaces' which is an attempt to appeal to students as individuals and to the various needs of individual students at different times.
- A place that, through furniture and features, feels like a home. Glasgow Caledonian University serves a diverse community, including many students who are 'first in the family' to university and those from various environments of disadvantage. Priority was given in the design to create a place that is welcoming and where students enjoy spending time. Although a large and open building, the Centre has many individual nooks and subspaces, the aim being that students come to identify with particular areas they feel to be 'their space'.
- The Centre is physically linked to nearby faculty buildings via corridors and walkways. The aim is to more closely integrate informal and formal learning spaces. Movement between teaching spaces in the faculty buildings and the informal spaces is encouraged. This creates a flow that contrasts with the usual physical separation of teaching spaces and libraries, and the typical isolation of the latter. There is evidence that this is working with some classes held in faculty buildings using the Centre for 'breakout' group work and discussion.
- While the Centre is a library, priority for floor space is given to people over books with space maximised to provide greater accessibility for students.

Conclusion

Mr Watson concluded by restating that the 21st century learning space demands flexibility, plays to diversity, has a social component, can create community has embedded technology and is inspirational. What is built today provides a context for current activity, determines pedagogy, creates communities and defines the future of institutions. Overall, the consistent thread is imagination. The importance of having a clear brief when designing places and spaces for learning, and understanding, that brief was stressed. In addition, because many risks are potentially involved, the importance of meaningful and ongoing evaluation of the use of these spaces in relation to their objectives is essential.

Useful resources

www.gcal.ac.uk/thesaltirecentre

www.jiscinfonet.ac.uk/infokits/learning-space-design (Designing and Planning Technology Rich Learning Spaces)

www.leswatson.net

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- Brand, S.** (1994). *How buildings learn: what happens after they're built*. New York, NY: Viking
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2.2 Aligning space, place and learning modalities

Associate Professor Kenn Fisher (Reported by Associate Professor Ian Reid)

Associate Professor Kenn Fisher is an Adjunct Associate Professor in the Faculty of Architecture, Building and Planning at The University of Melbourne and also is a Senior Research Fellow in the Faculty of Education at the University of South Australia. He brings a design and teaching background to his expert knowledge of learning and teaching spaces. Associate Professor Fisher is an ongoing consultant to the OECD after holding the post of Head of Program of Educational Building in Paris, as well as having held high level domestic University appointments. He is currently consulting on a number of significant university teaching and learning projects in Malaysia, Australia and New Zealand.

Associate Professor Fisher consults to a wide range of organisations in the design of learning spaces and has drawn upon the work of JISC¹, the InSync – ‘Spaces for learning’ publication², and publications of the Scottish Funding Council³ and TEFMA⁴ in this presentation. Associate Professor Fisher firmly believes that in order for lasting change to occur there is a need for the attitudes and practices of teachers to shift as well as that of the students.

Associate Professor Fisher spoke on the following three key themes: learning modalities, aligning pedagogy and space, and spaces and places for learning.

Learning modalities

In catering for the ‘next generation of learners’ it is important to understand how they live and work, and the devices they use to do so. The use of mobile phones and PDAs is a case in point, most clearly seen in Japanese young people, who use these devices intensively. Hence the design of learning spaces should not only focus on providing current devices but must also provide an environment that accommodates the devices that students are likely to have in the future.

There is a growing body of research on how people learn (Bransford, Brown, & Cocking, 1999) which should be considered in the design of learning spaces. Retention rates must improve if we are to make education truly effective. A key prerequisite for this process is the need to change academics’ views of the nature of learning and the nature of learners. In short, there is a need for teachers to better understand what is actually happening when learners learn, and more importantly, what causes them to stop learning.

We need to move from a teacher centred approach to learning, to a learner centred approach. In order to do this, the role of assessment is crucial. Our aim should be to move from Mode 1 knowledge to Mode 2 knowledge – which also entails moving to the ‘3rd space’ also referred to by Les Watson in his presentation.

Aligning pedagogy and space

¹ http://www.jisc.ac.uk/eli_learningspaces.html

² http://www.scup.org/pubs/books/is_ebrdls.html

³ http://www.sfc.ac.uk/information/information_learning/Spaces_for_Learning_report.pdf

⁴ http://www.tefma.com/PDFs/Publications/LearningEnvironments_Jan06.pdf

Associate Professor Fisher explained that pedagogical activities require specific spatial qualities to be effective. Each principle requires specific pedagogical approaches to support that principle, and these pedagogies are applied through five core activities or modes. These modes have direct implications for learning designs. The 5 pedagogical activities are (after Scott Webber, 2004): delivering, applying, creating, communicating and decision making.

Spaces and places for learning

The particular mix of the above activities required then allows for certain building designs to emerge. This is evident in the following examples:

- Collaborative Learning Studio – ANU (Trevitt, 2003)
- Collaborative IT Lab – QUT Faculty of IT
- Inquiry Based Learning - MIT Aeronautical Studio models (CDIO.org)
- Inquiry based Learning – Australian Science & Mathematics School at Flinders University
- Technology Enabled Active Learning TEAL lab, MIT Physics 1
- Chemistry 1 Collaborative at The University of Melbourne
- Collaborative Learning Centre – The University of Queensland

Each example employs physical space in different ways based on the principle of linking the five pedagogies above to particular physical arrangements, depending on their particular institutional contexts and the mix of learning approaches required. For many, the Airport Club lounge is the archetypal modern learning environment, but such a design suits some but not all of the above pedagogies. The design of individual spaces, group spaces, and activity-based spaces needs to be built on these principles.

Michael Habib⁵ points out that these spaces must be considered in relation to two other aspects – the nature of the library and the nature of the virtual environments that learners use. Another important issue is that of effective human-computer interface design. The University of Canterbury, NZ does work in this area⁶.

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- Scott Webber L. 2004. *In Sync: Environmental Behavioural Research and the Design of Learning Spaces*. SCUP.

⁵ http://mchabib.blogspot.com/2006/11/toward-academic-library-20-development_22.html

⁶ www.hitlabnz.org

2.3 Learning places and head spaces – Are we leading by example?

Professor Nick Klomp (Reported by Dr Caroline Walta)

Professor Klomp is the Dean of the Faculty of Science and Head of the School of Environmental Sciences at Charles Sturt University. Professor Klomp has taught and conducted research at four different universities in Australia and overseas prior to joining CSU. He was a Commonwealth Scholar, obtaining his PhD from the University of Glasgow in 1991. He was presented the Vice-Chancellor's Award for Teaching Excellence in 1997 and was nominated for the Eureka Prize for the Promotion of Science in 1999, 2003 and 2007. He works as ABC Radio's Science Correspondent and has been widely published in science.

Professor Klomp introduced the major theme of his presentation through the title 'Learning places and head spaces - are we leading by example?' Charles Sturt is a multi-campus university with five campuses located in regions of New South Wales. Learning spaces and places are of particular significance as the university undertakes the building of new spaces and the refitting of existing structures. Reflection upon the importance of learning spaces is required to:

- Enhance learning outcomes now
- Think of future building needs
- Keep relevant with learning needs and expectations of students
- Drive innovation in learning and teaching

In a theme common throughout the presentations Professor Klomp outlined his belief that learning spaces reflect attitudes about learning and the role and nature of communication. This involves team work, group discussion, and open dialogue. They are about the value of self-directed learning, about access and use of multiple sources of information, about the place of technology in this access and use and about the 'psychological contact between staff and students'. In another theme Professor Klomp referred to the need for vision and courage in leadership, vision to foresee the possible world of the future for which the learning spaces will prepare students, and courage to try ideas, face up to failures and learn from mistakes. He also noted that resistance to change was a strong feature of any community and especially, in his opinion, academic communities. This was noted as a major challenge currently for those trying to create learning spaces which will facilitate changing attitudes in staff and learners.

The second theme which underpins the relationship with place and space, is an overwhelming need to create leaders for the future who can deal with human population growth, environmental degradation, equity issues, education needs, and the management of war and peace. All we can be sure of is that the future will be significantly different and this presents opportunities and challenges for leadership in universities. Linking back to learning spaces Professor Klomp restated his belief that in addressing these key issues (population, environment etc) learning spaces play a key role. Through visionary thinking and planning, learning spaces can reflect attitudes as to how learning takes place, its relationship with teaching, environmental awareness and responsibility, individual needs and discipline, future change (through flexibility), courage and leadership.

Vision, courage and constant awareness of the overwhelmingly important issues facing the future regularly emerged during the presentation. The type of vision and leadership needed to create learning spaces for the future is based on knowledge, seeking evidence, rational thinking, a desire to learn, understanding change and courage to consider the alternatives. Professor Klomp highlighted that most people are at times, drawn to the irrational. For example: in the use of horoscopes, buying lottery tickets and fear of flying. In planning for the future, irrational, unsubstantiated beliefs can have the effect of hindering progress, and of repeating the practices of the past. Real vision needs to be based on genuine evidence, with an ability to recognise what is irrational, unsubstantiated fear, prejudice or bias. A genuine vision involves a preparedness to question beliefs, to not be fooled by correlations, to understand probabilities and risks, to seek knowledge and know where to find it. It also requires the courage to be wrong, to take risks, not be drawn by consensus beliefs and a rigorous questioning of all 'data' and 'observations'. 'Things are not what they seem' was a strong message to those in a position to lead and make decisions. It is important to listen to others who are attempting to engage in visionary practice and learn from their mistakes. This message is of course an important one for graduates to learn. The overwhelming urgency of our current world situation calls for our education system to create leaders of the future: leaders being people who can focus on learning as opposed to being taught (self-directed and life-long learners), people who can work effectively in groups, and people who can engage in problem based learning. The starting point for many universities has been the libraries, formerly places where books were stored and students found quiet corners to work.

Professor Klomp then spoke of the CSU experience of learning space and the planning process of the Learning Commons building at the Albury-Wodonga.

Firstly recognise that there will be resistance to change but strive to bring the staff on board. Professor Klomp shared the experiences and images produced by Ms Oakley (Executive Director Library Services), who travelled to other locations to review what was being done with libraries. These images were then available for critique. Learning from each other means starting with a whole stack of ideas; good ideas and ideas which have failed. He stressed the importance of learning from failures as a model for students in their learning journey as well as a model for planning for the future. Consideration of all the collective wisdom available produced a building which is represented diagrammatically in the following slides.

The nature of students in the 21st century is an important consideration in planning. Professor Klomp outlined his belief that the average 20 year old is not the student of the past. They use the web for social activity and study, expect to be able to find what they want online whenever they want it, do not want to wait, in normal activities uses SMS, blogging, instant messaging, Google, peer-to-peer services for music and movies, community bulletin boards, wikis, Facebook, MySpace, You Tube, etc; and expects to use these tools for all activities, including study. These students are already with us. We also need to consider the next generation coming along behind them, who regard the current student cohort as dinosaurs! Teaching staff have needs associated with developing the qualities needed to create future leaders.

Finally there is a glaring need for spaces in universities to reflect environmental leadership. Professor Klomp referred to the Talloires Declaration⁷ to which 360 universities (10 in Australia) have signed up. Participants to this Declaration are committed to a sustainable future with obvious links to environmental outcomes associated with building and design. As participants in this declaration, CSU has established an environmental plan involving reductions in water usage, elimination of waste, and the setting aside of land for improving biodiversity by declared dates.

⁷ http://www.ulsf.org/programs_talloires.html

Accordingly the buildings on the Albury-Wodonga Campus of CSU, including the Learning Commons building and teaching hub, demonstrate cutting-edge environmentally-sensitive design innovations. Use of natural light and passive heating and cooling, thermally-reactive walls, recycled landscape water and solar-powered lighting are all featured. Some buildings use rammed earth and composting toilets. Some problems have been realised and are being addressed. Professor Klomp again reiterated that clear goals, use of the best available evidence, risk analysis and ongoing evaluation are the best ways to address the needs of the future. It is not possible to solve problems and build for different students and different outcomes using the same kind of thinking which produced the problems we have today. Mistakes are part of the process and part of the learning.

Professor Klomp concluded that good learning spaces are not just about good buildings but good examples of vision; they embrace change and challenge, are good examples of courage and lead by example in creating new leaders.

2.4 The place of learning

Professor Daryl Le Grew (Reported by Dr Di Challis)

Professor Daryl Le Grew was appointed Vice-Chancellor and President of the University of Tasmania in 2003. Prior to this he spent five years as Vice-Chancellor at the University of Canterbury, New Zealand, and held posts as Professor of Architecture, Deputy Vice-Chancellor and Vice-President (Academic) at Deakin University in Victoria. Professor Le Grew is engaging the University of Tasmania with a strategic agenda that underlines excellence and distinctiveness in research and teaching, along with a program of strong community engagement and targeted growth. He is a Board Member of Universities Australia and the Carrick Institute for Learning and Teaching in Higher Education, and is a member of the National Cultural Heritage Committee. He was a member of the ARC Board until 2006. Professor Le Grew is a registered architect in Victoria, retaining an active interest in architecture in both Australia and New Zealand.

Introduction

Professor Le Grew commenced by stressing that, regardless of technology, real time human experience is just as fundamental to teaching and learning as ever. For Professor Le Grew, Space is an abstract notion and becomes Place when it is populated and injected with identity, memory and imagination. Teaching places are therefore redolent with memory and charged with expectation.

Not all about the past, and face to face teaching, is necessarily bad. In fact, great teaching events of the past provide a good steer for the future.

Professor Le Grew provided three evocative word pictures of occasions where teaching combines storytelling with a great sense of theatre - deeply challenging and engaging all those present. In each case, charisma and a sense of magic was created around key teachers: 'For way beyond the lecture time nobody moved, everybody's spine was tingling'. In those instances fairly ordinary teaching spaces became transformed. They became places as memory and identity were embedded. Teachers, old and young, working with technologies, old and new, can create and recreate this sense of identity, interpretation and meaning - all long remembered.

The changing nature of teaching and learning

The nature of teaching, learning and research is changing. So are the places of learning. The conventional model of infrastructure supplied 'in house' is not sustainable. New models must embrace the unconventional - they need to be collaborative, virtual, experiential and sustainable.

There are significant differences in student profile between the 1970's and now. Multiple career changes and life long learning mean diversity of the student cohorts; students now have quite different social and economic backgrounds, mature-age and international students are vital groups on campus. Many students, given their commitments and responsibilities, simply can't be on-campus at normal times. They need 24/7 and hybridised study opportunities. Young undergraduate students work on average 14 hours every week. They are as much part of the work place as part of the world we create on-campus. We must be sensitive to the needs of a wide range of international students, catering for their differing cultural expectations and alternative approaches to human relationships. The campus is now a cultural melting pot (reflected in more

than the prayer room and special cooking facilities), building in a new sense of camaraderie whilst respecting differences.

There have been similar significant changes in the academic profile over the past 3 decades. The sense of 'place' and the university community is not just for students. Academic and general staff are a vital component of the life of the university and its 'place making'. Staff needs are also changing rapidly and their concerns must be embraced. Visitors to the campus, alumni, partners in business and/or research, community groups and others all now seek co-location on-campus. This broader conception of a university community is transforming our sense of what a campus is.

Universities must be places of discovery. There is an amazing and growing diversity in learning styles and technologies. Professor Le Grew anticipates that over coming decades technology will make conventional spaces irrelevant. We carry learning technologies with us at present but in the future they may be integral and adjunct to our bodies. Our learning places will be virtual. At very least buildings will be infinitely more adaptable, even self transforming.

Even now we are transforming existing teaching spaces. Many of our more successful buildings have removed corridors to create open plan workplaces and socialisation areas, reflecting new academic working styles and connectivity. Formerly quiet libraries have been transformed into buzzing learning hubs. Even the humble lecture hall resembles the experimental theatre. These places reflect increased spontaneity and higher levels of serendipity as students and staff discourse about their ideas.

Learning places are not restricted to our campuses. In-service learning, flexible learning now see students integrating real-world experience. Students learn by immersion even in remote and often risky locations, on research vessels in the Southern Oceans, in disaster zones as members of global volunteer programs, or working with communities or people at risk closer to home. In these cases, students build that sense of place around an extended idea of a university.

The challenge

On another tack, Australian universities have a great infrastructure deficit that must be addressed. How can we integrate the strategic academic and physical planning of our universities together in long term sustainable forms – incorporating all this new thinking? And how can we do it in the context of a sector that is massively under-funded for infrastructure development?

Professor Le Grew contends that \$12-15 billion is needed in the next decade across the sector to achieve an infrastructure revolution. However, Commonwealth support for Australian universities has not been indexed and infrastructure has suffered in tighter fiscal environments. Backlog maintenance and deferred liability alone could be as high as \$2 billion.

The Australian campus faces huge problems. Many buildings of the last century are no longer fit for purpose - they may not have been great buildings to begin with.

Solutions require willpower and political persuasion. Universities can no longer rely on the public sector and we need to identify new sources of funds. And, interalia these will include the Higher Education Endowment Fund (HEEF), philanthropic contributions and collaborative models including co-investment, co-location and sharing of infrastructure in public/private partnerships.

Support will be sought nationally and internationally. To be successful our proposals must be exciting and build on what Australia can bring to the world that is different.

To achieve our aims, we need political persuasion, imagination and a modicum of luck.

2.5 Real and virtual learning space design: a systems approach

Professor Shirley Alexander (Reported by Dr Kerri Lee Harris)

Professor Shirley Alexander currently holds the title of Deputy Vice Chancellor and Vice President (Teaching, Learning and Equity) at The University of Technology Sydney. Professor Alexander has an international reputation for her research in information and communication technologies in education, served on two major committees dealing with Australian education and as Director of the Institute for Interactive Media and Learning

Professor Alexander described the ways in which University of Technology Sydney (UTS) is currently reconceptualising learning spaces. The potent influence of space on teaching was emphasised, as was the need to understand how learners use certain spaces, and why. In this context, a novel and powerful approach to researching students' attitudes towards space was presented. Present conceptions of the role of technology – in the design of both real and virtual spaces – were also featured.

The principal themes developed in the presentation are described below.

A framework for thinking about teaching spaces

When designing learning environments, recognition of the inter-relationships between institutional context, the thinking and behaviours of teaching staff, and the experience of students is critical. This is the framework within which UTS has been considering learning space design.

There are five elements in this framework:

1. University context

Institutions set the context for the teaching explicitly through teaching and learning plans, and implicitly through organisational structures and processes such as timetabling.

UTS has dedicated money from the discretionary funds provided by the Learning and Teaching Performance Fund to the design and renewal of teaching spaces.

2. Teacher thinking

The features of any particular teaching space send strong messages to teachers about type of activity intended.

There are some rather unexpected influences on 'teacher thinking' emerging with the rise of virtual spaces. Facebook is one example. 'Facebook can make teaching public'. There are examples of students discussing teachers and teaching in this open forum, and even of students generating 'teacher-appreciation' sites focused on individual teachers.

3. Teacher planning

The plans teachers make for teaching are heavily influenced by their often-implicit conceptions of teaching – 'teacher thinking'. Staff tend to focus on their activities as teachers, rather than the broader strategy, per se.

There is a long-standing tradition of focussing on content, the 'what' of teaching, in curriculum design and this persists. There has also been more recent emphasis placed on considering employer needs and generic skills development given the changing nature of the workplace. However, universities are becoming complacent. Students do want ready access to resources, but

they also want access to the *thinking* of university staff. As a result, more attention is being given to 'staff blogs' and other ways of uniting students and staff into a common community. The 'millennium generation' has implications for curriculum design.

4. Teaching strategies

It is the teaching strategy that the student experiences – this is the teaching 'seen' by students.

5. Students

What do we know about students of Australian universities?

This is an area that has received considerable research attention. We know that there has been a large and rapid increase in the use of social networking sites but that far fewer students are actively involved in immersive activities such as *Second Life*.

We also know from the AVCC study into student finances⁸ that many of our students spend considerable time in paid employment during the academic year, and that this impacts upon how they prioritise their university time.

The strategy employed by UTS

In their learning space design project, UTS deliberately focused *not* on the space itself, but rather on how it is used for learning.

This approach is reflected in the committee structures involved. First, a curriculum-design working group was formed to look at 'what learning means in a practice-oriented university?' From this committee, recommendations based on purpose are forwarded to an IT and infrastructure support committee. This ensures a deliberate emphasis is placed on the learning strategies and activities *before* technology.

Making decisions about technology

In making decisions about which technology should be given priority support, the University asks 'How many students will benefit?' and 'How will learning be improved?'

UTS have also elected to give priority to those technologies that benefit the majority of students. Specialist technology aimed at addressing highly specific requirements for small numbers of students are given much lower priority and support.

To assess the importance of various technologies to student learning, the first question should be 'What do students need to *do* in order to learn?'. Here, students themselves may not be the best judge. For example, there is a strong push from students for all lectures to be podcast, so that if they miss a lecture they are not seriously disadvantaged. This reflects a belief on the part of students that the lecture is an essential and pivotal element in their learning. As undertaking this would cost the University large sums of money, the decision was made to discuss with students (and staff) the role of lectures and podcasts in the context of the full range of learning activities students need to be engaging in.

Design that learns from students

Learning space design needs to draw and build upon how students currently use spaces, and not simply try to direct their use of space.

⁸ www.universitiesaustralia.edu.au/

According to survey data, students are looking for quiet places to study on campus, and places to socialise. A current UTS project involves students reporting on the 'best and worst' spaces on campus. Students select spaces, photograph them, then provide an explanation. The results are yielding a number of surprises. Some spaces which have been refurbished and 'look good' are rated poorly, while other traditional teaching spaces or unmodified informal areas are highly valued. This approach is extremely valuable, as the students involved are not only judging the space, but are providing insights into how and why they use particular spaces in the way they do – or would like to. Themes are emerging, although this project is not yet complete.

Role of virtual spaces

While learning management systems might be considered a form of virtual space, the focus here is upon the more immersive technologies such as *Second Life*.

Education is one of the main users of *Second Life*. However, the use tends to be highly conservative. There is a strong tendency to simply 'emulate what we currently do'. For example, many virtual spaces simply mirror conventional lecture theatres. A small group meeting in an unconventional space, such as around a log fire, is still a small group meeting - but with avatars rather than bodies. Other virtual learning experiences start in *Second Life*, but quickly move to spaces that are, in effect, conventional learning management systems.

There is a need to look more creatively at the possibilities afforded by virtual spaces. UTS have a current project that is using *Second Life* as a site for collaborative production. Students design within the space, and receive feedback from their peers.

2.6 Within, between and beyond

Professor Michael Keniger (Reported by Dr Henk Huijser)

Professor Michael Keniger is the Deputy Vice-Chancellor (Academic) with The University of Queensland. He has a rich history of architectural consultancy. His previous academic positions include Head of Architecture, Executive Dean of Engineering, Physical Sciences and Architecture. He is also the inaugural Chair of Urban Futures Brisbane for the Brisbane City Council, a member of a wide variety of architectural associations and a key designs advisor for various public works.

The title of Professor Michael Keniger's presentation, *Within, between and beyond*, refers to the central point of his presentation: that we need to think about places and spaces for learning in a holistic way, that incorporates the past, present and future and to accept that much learning now occurs outside the formal and physical learning spaces. Learning spaces on university campuses have traditionally been conceptualised as discreet, closed-off and segmented spaces, divided by firm walls, as in traditional lecture theatres and seminar rooms. The linking circulation spaces provided a way to get from one space to another, and as such had a specific function separate from the actual learning space. We need to reconsider these in-between spaces, as imaginative design can potentially make them an integral part of the overall learning space. In short, we need to think about places and spaces for learning as a continuum, both temporal and physical.

Thinking about places and spaces for learning as a continuum requires imagination and ideas, and it goes beyond physical spaces to include virtual spaces. It also recognises that learning happens beyond the university campus, and the temporal and spatial dimension of the continuum thus includes imagining how we can create a continuum between on-campus and off-campus time and on-campus and off-campus spaces, for example by modeling learning spaces on café spaces or by providing opportunities for engagement in in-between spaces. Pedagogy should be central to the design and the design ideas should reflect sound pedagogical principles, for there is no point in having great spaces without supportive ideas concerning teaching.

Great designs are often driven by a champion, who passionately believes in the ideas behind the design, which particularly applies in large institutions like universities. Champions are often looking for a specific element that defines them, and this is reflected in the University of Queensland's (UQ) St Lucia Campus, which on one level can be seen as a collection of such individually championed designs. But while passionate champions can achieve great designs, there is an associated risk of worrying about the monument, rather than the experience. And it is the learning experience that should be the guiding principle behind the design. In short, design of places and spaces for learning should be about the kinds of learning experiences they can facilitate.

Learning spaces should be open-ended enough to allow for students' imagination to be brought to bear, which is based on the recognition that it is not knowledge in itself that is most important, but rather what you do with it. Learning spaces should thus be flexible enough for students to engage with them in meaningful ways. Students arrange things in *their* way; they push boundaries, and create comfort zones. This process is not always predictable, and it does not necessarily align with how the space was originally envisaged to be used. But this process stimulates imagination, and innovation is driven by imagination in terms of what you do with knowledge, which is of increasing importance in the Conceptual Age.

Generational and societal changes have meant that students bring different and rapidly changing characteristics to both the physical and virtual campus. This raises the question of whether the conventional physical campus is now redundant. Teaching space for example has now expanded way beyond the four walls of class rooms. This does not necessarily make the physical campus redundant. However, the designs within the physical campus do need to change and adapt to these changing contexts, and should reflect them. As was mentioned by Les Watson, place and community are more critical factors than ever before, so places and spaces for learning should be designed to foster learning communities and engagement, both in terms of physical spaces and virtual spaces. In addition, the fact that teaching space has been expanded way beyond the physical classroom does not change a fundamental truism: a strong characteristic of well founded learning derives from the interaction between inspired teaching and meaningful student engagement. It is just that student engagement may need to be prompted in different ways, and the design of learning spaces plays a vital role in that process. Again, the basic principle is student-centric design, underpinned by sound pedagogical principles.

Professor Keniger highlighted a number of architectural designs from around the world, aided by a series of photographic images, to draw attention to various aspects of design and their effects. Firstly slides of the British Museum illustrated how certain spaces can be redesigned to adapt them to changing contexts and to serve different functions. The Reading Room in the British Museum is a large, impressive room and the reading benches are still there, but small computer screens now adorn those benches. As it turned out, those screens provide tourist information, and the room is mostly used for short visits by tourists rather than sustained periods of reading. However, the space retains its original atmosphere to some extent. By contrast, the former working courtyard that separated the Reading Room as a form from the remainder of the British Museum has now been enclosed with a translucent membrane. Simply enclosing this in-between space has changed the way the museum is accessed and used. Rather than just a walk way between buildings, these in-between spaces have now become more active spaces for social engagement in their own right. The integrity of the original buildings remains intact, but the in-between space has been re-purposed through thoughtful design. This raises the question of how design can be used to change or influence behaviour, which is a central question when it comes to places and spaces for learning.

An image of Sydney during the 2000 Olympic Games served to illustrate contemporary shifts in the role of public spaces. The image included a view of the Sydney Opera House in the background, which was dwarfed by a huge cruise ship in the harbour, but in particular by a huge media screen in the foreground that showed continuous Olympic events. Multimedia billboards have a large impact on public spaces, and the current generation of students has grown up immersed in such spaces. Consequently, when we design technology rich learning spaces that are cluttered, noisy and include large plasma screens in various places, it can be seen as a logical extension of the 'natural' environment of digital natives, and thus create a feeling of being 'at home'.

Two images of Frank Gehry designs were used to discuss two different aspects of the potential role of design. The Disney Concert hall in Los Angeles is so different from anything else, and executed on such a large scale, that it possesses an inspiring quality that is difficult to define and difficult to relate to. In other words, it makes a bold statement, which in itself has the potential to inspire creativity in a singular way. The other Gehry building discussed was the Stata Building on the MIT Campus. MIT was hitherto not known for its innovative buildings, so it was seen as a bold move. Professor Keniger concentrated on the design of the inside of the building, and the wide and curving corridors, which through their concrete design creates a feeling of a street. There are benches and people take their bicycles through those corridors, so the design of this space stimulates certain types of behaviour, in this case a simulation of street life suggesting an open

engagement with knowledge. Many of these examples can be classed as conforming to Florida's concept of a 'Third Space', as discussed by Les Watson, which blurs the boundary between formal and informal, public and private spaces.

Park Guell in Barcelona was originally planned by Antoni Gaudí as a housing site, but it became a public park after it was commercially unsuccessful and after Gaudí's death. The principal plaza within the park is edged by a curving wall that forms a continuous, sinuous, linear bench. Its plan shape prompts a variety of social interactions. Famously, it is used by families for numerous purposes, including various forms of courting by young people who stroll round the central plaza space, while an army of grandmothers keeps an eye on them from the sidelines. This illustrates that the ways in which designs are originally envisaged do not always eventuate, and public spaces are sometimes adapted to suit the needs of their end users. This has clear parallels to the earlier point about students arranging spaces *their way*, and it can be seen as an important part of the end users making the space their own.

Reference was also made to the Cloud Gate monument in Chicago, which looks somewhat like a giant silver peanut or coffee bean, and the surface of which is entirely reflective. In fact, it was designed to 'reflect the world', and people can walk underneath it in the middle of the structure. To illustrate the inspirational possibilities of some designs in catalysing enquiry and learning, Professor Keniger relayed the story of a young boy who was standing underneath the monument gazing up when he visited. On noticing him, the little boy got very excited, called him over, and urged him to look up with him at the extraordinary reflections in the concave surface above. If indeed we live in an Experience Economy, then it is these kinds of experiences that inspire learning, and it is clear that the design of this monument played a central role in facilitating this process.

Finally, Professor Keniger focused specifically on a number of recent designs of places and spaces for learning at the University of Queensland. Firstly, the Biological Sciences library which has recently been refurbished. The design for the library is inspiring students to use the space in different ways that are more suited to 21st century needs and student characteristics. Following the rapid increase of digitised resources, the library is moving more and more books out to create more space for engagement and collaborative learning. The Ipswich campus library is designed with similar pedagogical objectives in mind, and offers a kind of oasis with plenty of bench space, large amounts of plants and a small, simulated creek. So rather than a quiet space that students go to for quiet individual study, or a space where students simply go in to get a couple of books before leaving again, these new library spaces are designed to stimulate 'lingering'. They provide a pleasant environment, and by extension stimulate collaborative engagement because they are social spaces. On the flip side, it does reduce the opportunity for students who prefer to study in a quiet individual space, but it is too early to say whether this poses a problem.

The Collaborative Teaching and Learning Centre (CTLC) is specifically designed with the objective to better use space for pedagogical reasons. The design is based on the recognition that learning is not restricted to the traditional lecture theatre but is a social process which occurs in a range of spaces, both physical and virtual. Collaboration is therefore built into the design, and in fact the rooms in the Centre do not work optimally if they are used for traditional ways of teaching, for example in the seminar or lecture format. To avoid staff trying to use these spaces in traditional ways, there is a mandatory requirement of a three hour workshop before staff are allowed to teach in these spaces. The rooms are technology rich, and the spaces are highly flexible and adaptable to different teaching modes, which can all be manipulated from the front of the room. The central concept for these rooms is collaboration, and the design is fully informed by that concept. The smaller rooms are curved, in a style that echoes Gaudí's Park Guell, and the furniture arrangements are deliberately designed to make it impossible *not* to collaborate.

The First Year Engineering Students Learning Centre is based on similar pedagogical principles, as well as an understanding of changing student needs. The Centre has glass walls and doors, and is located between lecture theatres that also have glass back walls, to create a continuum between formerly firmly separated learning spaces. The space itself is informal, busy, and again technology rich. This is designed to create a continuum between formal and informal, and between physical and virtual learning spaces. Since it opened the Learning Centre has been very successful and is used by a large number of students. Across the campus, there has been a huge increase of demand for similar centres in other faculties, with staff saying 'we want this kind of space'. What they really mean however is that they want this kind of *engagement*.

In his concluding comments, Professor Keniger made a point of dispelling the idea that creating learning spaces allowing for student engagement and are learner-centric, in the sense that they are cognisant of contemporary student characteristics, is all about 'fun'. We should resist teaching as entertainment, as learning is not all fun and games. The objective should always be to design spaces 'within, between and beyond' that are based on sound pedagogical principles and stimulate learning, imagination and creativity.

3. PLACES TO LEARN AND TO TEACH

Different aspects regarding the design of places to learn and teach were covered by a number of presenters.

Professor Geoff Crisp (The University of Adelaide) touched on how learning space design is becoming increasingly important as it impacts on student learning, student satisfaction and as universities strive to make learning active, authentic, student-centred and contextually and socially relevant.

Professor Mark Bush presented on the Integrated Learning Centre at The University of Western Australia which was inspired by developments in North America, Canada and Europe and how courses are adapted to make good best of the spaces and incorporate industry.

Professor Sandra Wills shared on lessons learnt from the redesign of spaces to make them more effective and the various types of spaces identified by University of Wollongong's Spaces Portfolio. She argued that the development to integrate physical and virtual spaces is a positive development.

Professor Richard James (The University of Melbourne) warned against adoption of design models based on a single theory of how students learnt best and argued that a pluralistic approach which accommodates disciplinary difference in pedagogical understanding; and the range of learning activities and learning preferences, will work better.

Ms Jo Dane (Monash University) presented on the value of post-occupancy evaluation as a tool for improving the design of future places and spaces for learning. Post occupancy evaluation allows for improvements to design, help prevent mistakes from recurring and improves the use of existing spaces in more appropriate ways.

Associate Professor Peter Jamieson (The University of Melbourne) raised concerns of how universities undertake the design of effective learning environments. Each project needs to be negotiated between many stakeholders; those driving developments who may not understand the use of educational technology, academics and students in the real world.

Mr Derek Powell from The University of Queensland shared a pedagogy-space-technology learning place rubric which informs the design and post-occupancy evaluation of learning and teaching spaces. He emphasised that pedagogy should inform design.

Dr Michael O'Donoghue from the University of Canterbury (New Zealand) presented on his program of global research involving 135 children aged between 7 to 10 in seven countries. The research involved providing Lego sets to children, asking them to design their dream schools. It revealed three international constants in students' design: ICT, café and recreation. He concluded that students and staff are stakeholders who must be actively involved in the design of a learning environment, appropriate to pedagogy, to promote active learning.

3.1 Learning and teaching spaces that actually assist learning

Professor Geoff Crisp (Reported by Associate Professor Ian Reid)

Director Centre for Learning and Professional Development, The University of Adelaide

Learning space design directly impacts upon student learning. Learner centred concepts are important in developing student capabilities in relational and extended abstract responses. Secondly student satisfaction surveys are becoming increasingly important and will impact teaching practices and learning activities. Thirdly, university environments must support efforts to make learning active, authentic and contextual, engaging, student-owned and social.

Why are we transforming learning spaces?

Professor Crisp claimed that there is a need to change both how the teacher teaches and thinks! Room design tends to shape both the learner's expectations and teachers' behaviour.

We should consider 'What do we expect learners to do and how do learning space designs influence that?' Professor Crisp considers interaction and engagement as the most important outcomes from new space designs. Active learning is emphasized in contemporary learning theory. Interaction leads to greater student engagement, retention and competence. Thus universities need to develop innovative combinations of space, technology and pedagogy that make learning more interactive and effective.

The Queen's building, Interactive Learning Centre in Kingston, CA is an example of a 'living building' where engineering students can see the operation of the building (eg air conditioning etc) in operation⁹.

Learning space designs

The design principle behind teaching spaces can enhance learning. Are we designing teaching spaces or learning spaces? The design of learning spaces needs to include the real, the virtual and the social, acknowledging different learning styles

Learning spaces need to change as educators integrate authenticity, communication, collaboration and computing capabilities for a holistic learning experience.

Use of ICT for studies:

- Using computer for study 84%
- Searching for information 93%
- Course administration 84%
- Communication SMS 84% Instant messaging 75%
- LMS to access course material 81%

⁹ <http://livebuilding.queensu.ca/>

Recent studies of the use of ICT in learning are interesting (Kennedy, Judd et al 2008) It should not be assumed that because students can use technology for functional or social activities that they automatically know how to harness technology to improve learning

Current trends:

- Wireless communication and virtual local area networks
- PDA's (personal digital devices)
- Collaborative learning
- Situational learning
- Flexible rather than fixed seating
- Streaming audio and video, mp3
- Multipurpose laboratories
- Smart teaching enhanced by smart classrooms

Elemental teaching/learning activities that a learning space can support¹⁰:

- Enable use of basic computing/connectivity
- Enable learner or teacher to discover, import and display information easily, including the ability for a student in a large class to point within an image, or images, while explaining, 'comparing and contrasting,' or asking a question
- Enable participants to hear and speak
- Enable participants to see one another's faces
- Enable teacher to spot patterns in student thinking in order to adjust instruction
- Enable participants to review previous classroom communication
- Enable students to talk with one another during class sessions
- Enable a shift from a plenary format to small group work, and back
- Enable the use of outside experts
- Enable students to use one another as learning resources
- Enable teachers and students to use the classroom easily
- Enable participants to interact spontaneously, other than through course activity

References:

Kennedy G E, Judd T S, Churchward A, Gray K, Krause K, *First Year students' experiences with technology: Are they really digital natives?* *Australasian Journal of Educational Technology* 2008, 24(1), 108-122

¹⁰ www.tltgroup.org/Facilities/Activities-TOC.htm

3.2 The UWA integrated learning centre

Professor Mark Bush (Reported by Dr Caroline Walta)

Dean of the Faculty of Engineering, Computing and Mathematics, The University of Western Australia

Professor Bush began with an overview of the need for Engineering courses to develop students with both technical and professional skills over the four years of their course. There is a current realisation of the need for universities to develop professional skills, characterised by attributes such as leadership, teamwork, communication, the ability to undertake project management, to be aware of business practice, to interact with clients and be capable of financial management.

Changes over the last decade have been driven by industry wanting to see these professional skills in graduate students and therefore partnerships between universities and industry are important. So, how do we develop these skills in the context of developing technical skills? Professor Bush questions the value of large lectures and indicates that project based work, in collaboration with industry, has the potential to fulfil both needs.

Project based learning is not new to engineering. Recently the University of Western Australia (UWA) has linked project based learning outcomes to a newly configured learning space. Outcomes associated with project work include enhanced depth of learning, placing theory into context, self-directed learning, cross-disciplinary understanding, leadership, teamwork, entrepreneurship, project management, health and safety, financial planning, dealing with other professionals and technical support and formal and informal communication.

One project involved engineering students from UWA in the construction of a 'formula' racing car, designed to specifications, as part of an annual competition associated with the Society of Automotive Engineers (Formula-SAE). The initiative has been highly successful. Students have to design and build a vehicle within a year. Student feedback affirms the achievement of both technical and professional outcomes highlighted earlier.

Secrets of success:

Sixty to seventy students are involved in the project together with a small number of academic staff. This is significant as the whole project is generally undertaken by teams of students.

- Women and men are attracted equally.
- The team must work together to be successful.
- The course is structured so that participation is considered part of the overall course – with a continuity of involvement over the years.
- Cross disciplinary involvement of students from other faculties.
- Involvement and sponsorship of industry is a vital component.
- Students have to understand the technical components to undertake the project successfully.

With the value of these projects established, Professor Bush highlighted the need to consider a purpose built space in engineering faculties which will enable such courses to include a wider range of such projects.

The proposed purpose built Integrated Learning Centre at UWA was inspired by developments in North America and Europe. An example is Queen's University in Canada which highlighted the need for flexible spaces to meet the needs of project work as highlighted above, including the need for the space to provide storage areas for ongoing work, and to be reconfigurable when different phases of projects arise or when projects change. Working space is another key component.

The space is underpinned in its structure, by the belief that it is a professional work place for students that mimics the industrial work space. The space must accommodate projects through all phases from planning to execution, must accommodate client interaction, must be a place where different disciplines can interact, where different year levels can interact and a place where industry and students interact. UWA has been designing this space over several years with student collaboration. A sense of home with spaces for clubs is highlighted. This is a space with common labs and workshop facilities, meeting rooms, offices, workspaces, presentation space for students to carry out project work associated with courses of study in any programme, space for specific courses to adapt to project-based learning - with significant industry involvement and support. This structure is conceived over two levels with the ground floor being a 'prototype and testing centre' consisting of variable spaces for working with projects, offering storage and staff offices. The second floor becomes the 'project management centre' where students can meet with clients, meet with each other, practice presentations and work under pleasant conditions.

Significant industry support is being attracted by this project. This is a unique feature of the integrated learning centre at UWA – sponsors will not only assist with the cost of developing the space but will be intimately involved in the operation of the centre, providing an environment of continuous interaction between students and industry. The lead sponsor is the Monadelphous Group – the Centre will be known as the 'Monadelphous Integrated Learning Centre'.

In conclusion we need to adapt our courses to make good use of these spaces and approaches and incorporate industry.

3.3 Architects win awards not teachers: supporting the design of new learning spaces by evaluation and dissemination

Professor Sandra Wills (Reported by Dr Di Challis)

Director of the Centre for Educational Development and Interactive Resources, University of Wollongong

Professor Wills believes there are two groups of people: those who own the space around them and those who are happy to have the space own them.

As a member of the first group, she operates by seven principles: let there be light; let there be air; let there be interaction; let there be flexibility; let there be NO clutter; let it not cost much; and technology should be transparent.

These principles were illustrated and evidenced during the presentation through photographs and comment.

Professor Wills believes that the emphasis placed on eLearning has meant that the physical environment has suffered and it is a positive development that increasingly the two can be integrated.

We are not currently designing successfully because we are not taking into account what users actually do. 'Spaces are themselves agents for change. Changed spaces will change teaching practice' (JISC UK 2005), Professor Wills contends this has not necessarily happened and would change the word 'will' to 'might'.

Drawing upon 14 years experience at the University of Wollongong, Professor Wills shared the following lessons learnt. It is important to provide:

- More pre- and post- renovation photos for evaluation and dissemination
- More consultation with teachers
- More support post-renovation from Head and Dean as champions
- More instructions on the equipment as users did not necessarily use functionality provided
- More teacher training as teachers need to get used to changing technologies and especially changing pedagogies
- More mobility - tables & chairs on wheels (initially not used because of OHS issues and fear of theft)

The process described and advocated is one where the design is conceptualised and implemented in consultation with stakeholders. It is then evaluated with feedback from staff and students as users and redesigned as appropriate in response. The latter two steps are often the ones missed.

At University of Wollongong (UOW) a Teaching Facilities Subcommittee of the University Education Committee comprising service providers and faculty members was formed 13 years ago. Initially concerned with tasks such as prioritising upgrades to spaces with what used to be very expensive technology. Now there is more emphasis on:

- Space versus technology
- Developing a vision for learning and teaching spaces and facilities

- Offering grants to teachers for innovative design
- Providing a project officer to support evaluation

Importantly, meetings are professional development activities, being held in teaching spaces (in contrast to meeting rooms) to increase awareness and to brainstorm what can be done with the space.

The UOW Spaces Portfolio has identified the following spaces:

- Flexible teaching spaces
- Informal learning spaces
- Connected spaces
- Professional spaces
- Collaborative learning spaces
- Lecture spaces

A number of spaces are now also set aside for block bookings which had been an irritating timetabling issue in the past for subjects taught intensively in a block rather than the traditional one lecture per week for the semester.

More effective use of space was illustrated by turning corridors into junctions without impeding traffic flow, using roof top spaces and redesigning computer labs.

The UOW Learning Spaces Project has four elements:

Teacher empowerment

Raise awareness of importance of space design for improving learning and teaching
Attract academics to get involved in redesign of existing spaces to assist their teaching

Evaluation

Provide a forum via which academic and student feedback on evolving designs can be recorded
Underpin decisions about design, and re-design, with on-going educational evaluation

Professional development

Create accessible resources to accompany workshops about the role of space in learning and teaching

Reward

Recognise teachers' work in design

So, a Carrick teacher award for space design in contrast to the customary awards to architects?

Further information is available at <http://cedirsd.uow.edu.au/ils>.

References:

Designing Spaces for Effective Learning: a guide to 21st century learning space design, JISC, UK, p. 30

3.4 The theories of teaching and learning underpinning space and design decisions

Professor Richard James (Reported by Dr Kerri-Lee Harris)

Chair of Higher Education and Director of Centre for the Study of Higher Education (CSHE), The University of Melbourne

In arguing for an approach to learning space design firmly grounded in educational theories, Professor James cautioned against adoption of design models based on any single theory of how students learn best. Learning space design needs to be pluralistic, and not doctrinaire. It needs to acknowledge profound disciplinary differences in pedagogical understandings, the role of a variety of learning activities, and the diversity of students' individual learning preferences.

The presentation set learning space design within the broader context of higher education in Australia, including the key educational challenges relating to the quality of student learning and the student experience. In this context, the need for an evidence-based approach was emphasised. The most effective improvements to learning spaces are likely to be those that are simple, flexible, and that involve cycles of incremental change and evaluation.

The focus of the presentation was on teaching spaces, although many of the considerations are similarly important in the design of informal learning spaces.

The principal themes developed in the presentation are described below.

Challenges relating to the quality of student learning

The sector currently faces a number of major educational challenges relating to the quality of student learning and the student experience. These include:

- Access, equity and student diversity
- New student expectations
- The study-work-life mix: Patterns of engagement
- Student preparedness and academic standards
- Renewing learning spaces and the 'churning' of ICT
- The renewal of undergraduate curricula

These interrelate in numerous ways, and together provide the educational 'big picture' for learning space design. For example, changing student expectations, patterns of engagement and use of ICTs, have led to significant changes in the conception of informal learning spaces in libraries and elsewhere.

The recent emergence of learning spaces as an issue

In addition to the educational challenges cited above, there are several other factors currently driving interest in learning space design. First, ageing infrastructure is a growing concern on many campuses. Alongside new facilities for research and teaching, many spaces are looking 'tired' and neglected, and technology seems more 'afterthought' than integral element. Second, there is new interest in the influence space might have on teaching and learning approaches and possibilities. There is a growing expectation that teaching and learning spaces will shape and enhance the pedagogy. Third, most universities have poor 'decanting' spaces. Engagement and interest generated during a class can be

quashed when students are required to quickly vacate a room into spaces not conducive to continued discussion, debate and thinking.

The current interest and discussion around learning space design encompasses a broad range of physical environments. These can be loosely grouped as formal and informal spaces. Formal spaces, or 'teaching-spaces', typically include tutorial rooms, lecture theatres and laboratories, and are used for 'in-class' teaching and learning. Informal spaces can include just about everything else. The informal spaces currently receiving design attention range from libraries and learning commons, to corridors and outdoor spaces.

The current design for both formal and informal spaces centres on prevailing themes of collaborative learning and ICT integration. This contrasts with the much narrower, lecture-theatre focus of the 1990s phase of learning space renewal in Australian universities. The emphasis then was on renovations in aesthetics and acoustics, and the integration of computer projection and central room management controls. In major renovations or construction of new facilities, there was also a move away from steeply raked seating and efforts were made to reduce the distance between students and the lecturer.

Theories and assumptions

The restoration or creation of teaching and learning spaces is always based on a theory. Such theories may be implicit or explicit, informal or formal. Examination of these theories is therefore important, as otherwise there is a risk that narrow conceptions of teaching and learning might become embedded throughout learning space design.

Taken to one extreme, for example, the social constructivist approach has been used to argue for the promotion of collaborative and experiential learning, and the abolition of teacher-led presentations, 'passive' listening and observation. This often leads to the creation of dichotomies such as:

- Teacher-centredness vs student-centredness
- Didactic teaching vs experiential learning
- Passive learning vs active learning
- 'Lectures are bad' vs 'group work is good'

Such dichotomies are particularly unhelpful as, on these premises, the best learning space design would promote experiential learning and inhibit teacher presentation and lecturing. While research shows that people do learn experientially through trial and error, experimentation and feedback, people also learn vicariously. The experiences of others are shared through language. Such 'learning through telling' can be very powerful and efficient, and complements experimentation. The two are not mutually exclusive, and teaching spaces therefore need to support both.

Neither the type of activity nor the space ensures high quality teaching. Lectures can be brilliantly stimulating and challenging, and fine examples of active learning. Often they are not. Equally, while group work can be brilliant, it often leaves students frustrated, confused and bored through poor design and execution. Both good lecturing and effective group work design require considerable teaching skills.

Well-designed teaching spaces can assist, but are neither necessary nor sufficient. Space, in itself, is not the ultimate determinant of the quality of human intellectual engagement and interaction. Ultimately, the teacher is more important than the space. Inspirational moments, and concern and respect for students can occur just about anywhere.

Developing principles for improving teaching and learning spaces

Design of effective spaces is ultimately a compromise between competing goals: high aesthetic standards; maximum flexibility in modes of teacher-student and student-student interaction; seamless integration of ICT; and limited resources. In the absence of a sound, evidence-based theoretical basis on which to make decisions about learning space, it is necessary to take an experimentation approach. In these circumstances, it is best to:

- Consult widely - incorporating the implicit, often sophisticated, theories of teaching and learning of academic staff;
- Err on the side of conservatism, and so learn incrementally; and
- Be suspicious of singular prescriptions and untested assertions (no matter how often they are repeated).

The following list is offered toward the development of a set of formal principles for learning space design in Australian universities:

1. Adopt a stance that is eclectic and pluralistic rather than doctrinaire. Recognise that a variety of approaches to teaching and learning are valuable.
2. Acknowledge profound disciplinary differences. Draw on the implicit pedagogical understandings of academic staff.
3. Assume a 'law of diminishing returns' with regard to the educational returns from investment in teaching spaces. Avoid over-engineering.
4. Assume rapid technological change.
5. Avoid a cargo-cult mentality that attaches undue emphasis to the role of the learning space.
6. Evaluate and start building - and planning – from an empirical base.

Prioritising strategies for enhancing learning in Australian higher education

To keep the role of space in perspective, it is informative to rank various strategies for improving university teaching and learning in order of potential influence. Improvements to informal spaces is, arguably, more critical at this time than is improvement to teaching spaces. It can also be argued that reducing class size, improving assessment practices, and raising the status of teaching in academic cultures would have a more significant effect on teaching quality than would redesign of learning space.

3.5 From design to occupancy of new generation learning environments

Ms Jo Dane (Reported by Dr Henk Huijser)
Lecturer, Bachelor of Interior Architecture, Monash University

Ms Dane undertakes teaching and research in the Faculty of Art & Design at Monash University. Her presentation focused on the value of post-occupancy evaluation as a tool for improving the design of future places and spaces for learning. Post-occupancy evaluation (POE) evaluates both design and human needs in relation to each other. This echoes Mr McClintock's point about the importance of an outcomes-based approach that takes note of human needs or end user needs.

Ms Dane outlined three different types of POE: building systems, environmental sustainability, and educational adequacy. The first two do not really relate to the end users in a direct sense. Evaluating educational adequacy has the potential to focus directly on what the students and teachers actually do in a learning environment. Firstly, Ms Dane made the point that POE cannot necessarily measure academic performance, and that utilisation and frequency rates are not a reliable measure of success either. What POE *can* measure is the degree of alignment between the designer's intention and the behaviour of its end users. Provided the designer's intention is based on pedagogically sound principles, this then has the potential to provide us with a measure of success in terms of how and why a particular space facilitates certain learning outcomes. To illustrate her points, Ms Dane used a case study of a learning space at an Australian university, designed to facilitate collaborative learning for multimedia students, as an alternative to a computer laboratory that would have otherwise been allocated.

As learning spaces, traditional computer laboratories present certain problems. For example, they generally cater for individual students to sit behind single computers, which is not conducive to group work. The latter is particularly relevant for multimedia students who often need to work in teams. It is interesting in this respect to refer back to the Collaborative Teaching and Learning Centre at the University of Queensland, which has deliberately designed its spaces with more chairs than computer screens to stimulate group work. With reference to her case study, Ms Dane discussed a number of prerequisite considerations which are important to recognise as starting points in the design process. Firstly, a clear educational vision needs to be communicated to the whole design team, which again draws attention to an outcomes-based focus. Secondly, a new type of learning environment design project is aided significantly by an academic 'champion', who drives the pedagogical vision. Thirdly, once built, the new space needs to be adequately promoted to stimulate its use. Finally, there needs to be sufficient time for academic staff to learn to use the space, or participate in professional development as a means of encouraging a particular pedagogical approach.

In terms of post-occupancy evaluation methodology, there is great value in observing teachers and students in the educational setting, to establish if the space is being used as anticipated. However, while the alignment between educational objectives and design is vitally important, we can learn a great deal from recognising unanticipated uses of learning spaces, and feed such observations back into the design loop.

In establishing a holistic plan for new types of learning environments timetable managers may be a valuable part of the procurement team, to understand the educational intentions of the space and avoid

timetabling problems further down the line. When evaluating utilisation, it is important to keep an open perspective and consider all possible factors that could influence this. Poor utilisation rates do not necessarily mean that the space is unsuccessful. In Ms Dane's case study for example, locating the facility in a remote part of the campus was a disadvantage as people were less likely to accidentally encounter the space; it does mean however that the space needed to be promoted more. With reference to the space itself, POE revealed that technology needed to be distributed more throughout the space, and that more effort needed to be made to create a space that looks and feels like a student space.

Overall then, post-occupancy evaluation of learning spaces is useful for three main reasons. Firstly, it allows for improvement on previous iterations. Secondly, it can help to prevent repetition of mistakes; and thirdly, it can help to improve the use of existing spaces in more appropriate ways. However, while the value of POE is clear, a number of questions remain with regard to its application. For example, who should perform a POE? Who is qualified to perform a POE, and according to what criteria? Who stands to benefit from the results? For example, to what extent does the architect benefit, and to what extent does the university benefit? And perhaps most importantly, how do students benefit? These are questions that always need to be carefully considered when undertaking a POE. In conclusion, post-occupancy evaluation of places and spaces for learning is as much about people as it is about buildings, and it is for this reason that the focus should first and foremost be on the learning experience. It is the learning experience that the design should facilitate and stimulate.

3.6 E-nuff: why place matters

Associate Professor Peter Jamieson (Reported by Dr Di Challis)

Office of the Provost, The University of Melbourne

Associate Professor Jamieson raised concerns with how universities undertake the design of effective learning environments on campus. He contends that within universities there are many stakeholders driving developments in the use of educational technology who do not understand that academics and students using the technology also function in the real world. He highlighted a design and development divide and a further physical and digital environment divide which results in universities implementing fragmented and often contradictory strategies for improving teaching and learning.

Creating effective, integrated physical and digital learning environments

To create such environments we must acknowledge that:

- Individuals live in a physical setting regardless of whether they are simultaneously integrated into a digital one.
- The teaching and learning process 'takes place' in settings integral to the process and outcome.
- The current university setting is poor at supporting the existing 'in person' teaching and learning approach.
- The current campus – including classrooms – may not be suitable environments for the integration of new digital technologies.

One of Associate Professor Jamieson's key points was that learning is both an intellectual and affective experience.

On the basis that the degree of comfort influences the ability to learn and the duration of effort, we need to consider such aspects as:

- The quality and type of furniture, especially seating
- Room temperature
- Lighting (both natural and artificial)
- Colour, material, decoration
- Physical movement within the setting

We need to seek students' perceptions of their learning environment and whether they think it is appropriate and meets their needs as this will impact on their motivation to learn and their sense of ownership of the learning environment. Student commitment to remaining on-campus for informal learning may be compromised by inadequate physical settings in libraries, IT spaces, cafés and lounges.

Rethinking e-learning technologies as physically situated experiences for both students and staff

Associate Professor Jamieson contrasted two photographs of a student using a mobile phone to illustrate that the circumstances where the technology is used is vital to the experience. In the busy setting near a tram stop - in contrast to the University garden setting – noise impeded communication and other activity, and lessened concentration. Hence we need to acknowledge the individual's self-awareness and capacity to be affected by the wider environment in which they act and where learning is 'taking place'.

Associate Professor Jamieson claims that we have not been subtle in our understanding of computing and have rushed to implement solutions. In the case of laptop computers, he identified tensions arising from alternative paradigms depicting their use:

View A: Reduce IT labs with consequent cost-saving and gains in mobility and choice.

View B: Do not assume any setting is appropriate for the use of laptops and provide adequate spaces that support collaboration and efficiency. Several photographs of students using laptops in arguably inappropriate and possibly unhealthy sites on-campus served as telling illustrations.

View A: Laptop computers promote collaboration and interaction via shared co-located activity.

View B: Use may result in intrusion into other's personal places of solitude, reflection and even sanctuary.

Hence, e-learning should be an integrated element. The key challenge for universities is the integration of personal IT devices that are increasingly functional, mobile and proliferating across the campus through both teacher and student use. Communication is an important part of community but they are not the same and telecommunication use does not necessarily lead to the creation of community on campus. Universities need to provide suitable on-campus settings where individual IT devices can be used collaboratively.

An example of an intensive experience over 5 days

Associate Professor Jamieson described the Carrick supported Intensive learning and design workshop (September, 2007) that brought together 20 representatives of Australian universities together over 5 days to address the design of an actual project site. The aim was to generate an educational vision and statement of intended educational purpose prior to the involvement of architects. Arguing that this is what is missing at the moment, he felt that this gave educationalists an opportunity to articulate what they wanted. While most participants had no experience of design, the work they produced was 'absolutely outstanding with people working in ways they hadn't before'. Participants, reflecting on the experience, made three key points: it was enormous fun, they were prepared to take risks and it was effective. A report of this workshop can be found on The Carrick Institute website at <http://www.carrickinstitute.edu.au/carrick/go/home/grants/pid/469>

Conclusion

We need ways to transmit 'personal' material into the 'public' realm for informing, sharing, co-creating, critique, assessment etc. We need better understanding of why we bring people (staff and students) to be together on-campus. We cannot assume that students will necessarily make choices in their best interests. We need to take more time to think about the complexities and do more to inform architects and related parties.

3.7 Technology in next generation learning spaces

Mr Derek Powell (This report is summarised by Ms Jacqui Elson-Green from the reports of Associate Professor Ian Reid, Dr Caroline Walta and Dr Kerri-Lee Harris)
Manager of Teaching Technology Support, The University of Queensland

Mr Derek Powell, Manager of Teaching Technology Support at the University of Queensland (UQ) opened his presentation at the Places and Spaces Seminars with the question 'How do you do it and how do you know when you have done it well?'

UQ is now in the second generation of its Collaborative Teaching and Learning Spaces and has gone to considerable effort to evaluate the first phase of development, Associate Professor Reid reported from South Australia, noting that recent surveys by the university indicate that staff agree technology is important for effective teaching.

However, Mr Powell told the Sydney seminar that technology is the under-emphasised dimension in discussions around learning space design. Outlining the thinking behind the Advanced Concept Teaching Space project at UQ, Dr Harris noted key messages stemming from this exercise. They include the importance of experimentation and evaluation, and the need to enable users' technology rather than supplying it.

The principal focus of the presentation was on teaching spaces, including lecture theatres, tutorial rooms, laboratories, and highly specialist spaces. Informal spaces were also included in the context of the need for ubiquitous wireless access to an enterprise-wide network, as well as libraries as sites of major innovation in learning space design.

Discussing technology in next generation learning spaces, Mr Powell explained how he uses a pedagogy-space-technology learning place rubric which takes account of these three factors to inform the conceptual design and post-occupancy evaluation of individual rooms or networks of places. Pedagogy comes first in this process.

The theoretical framework defined by the UQ project highlights the interdependence of pedagogy, space, and technology. A detailed description of the Advanced Concept Teaching Space (ACTS) was presented as a case study to illustrate the pedagogy, space, technology (PST) approach. In addition, the ACTS was used to illustrate the role of radical change and experimentation in learning space design, the importance of which was strongly advocated.

Designing for technology into the future

Does technology matter? Mr Powell contends that university administrators believe that it is a significant feature in retention of students with a recent UQ survey revealing that 77 per cent of staff who responded agreed. Dr Caroline Walta observed at the Perth seminar.

Mr Powell maintains that students are most comfortable with their own technology. In future, therefore, universities should be looking to ways in which students' use of their own devices can be more effectively incorporated into learning spaces. This will mean a shift away from supply of specific systems, and toward enabling a variety of devices to connect to university systems and to one another.

At the South Australian seminar, Associate Professor Reid noted Mr Powell's point that the increasing number of students bringing devices on campus such as wireless ipods blurs the line between private and university use. This raises the question for IT providers about whether they need to support students' electronic devices.

While it is impossible to precisely predict technology needs in future, it is possible for learning space design to incorporate some key features in anticipation. For example, it is safe to assume that ready access to power supply will be essential. Wireless network access is important, but wired systems are likely to continue to play an important role. USB is also likely to remain the most compatible connection for some time.

As an aside Dr Harris noted Mr Powell's observation in Sydney that for Australian users of technology – including on campus university students - the most significant impediment to widespread technology innovation are pricing structures for Internet Access that limit the amount of material that can be downloaded. An 'all you can eat' approach is more important than increased speed in most areas.

The importance of teaching space design

In discussions around learning spaces design, there is considerable focus on the development of informal learning spaces. Learning centres that have evolved from the more traditional libraries are one example. Other spaces for informal and collaborative learning – such as corridors, atria and student 'hubs' - another. There is also growing emphasis in some areas of the potential of virtual learning environments.

There remains, however, a need to feature formal teaching spaces in discussions around learning space design. Teacher-led teaching has a role into the foreseeable future. 'The death of the lecture theatre has been very much exaggerated,' according to Mr Powell. This raises questions around what can be done within teaching spaces to facilitate student interaction with other students, with teaching staff, and with learning materials.

The PST theoretical framework

The Carrick funded 'Next Generation Learning Spaces' project at UQ is based on a tripartite framework in which pedagogy, space and technology (PST) are related in a highly dependent fashion. The development of this framework was a response to the observation that many teaching space designs are driven primarily by either the prevailing technology, or the space, and are usually unsuccessful as a result.

The PST framework argues that good teaching space design relies on first identifying the types of teaching that a space should foster and aligning these features with the most appropriate physical space and technology. Importantly, the loop should then be closed through evaluation of the influence of both space and technology on the pedagogy. The PST framework does not aim to provide a solution, or even a range of solutions. Rather, it is a process by which particular and unique solutions for individual situations may be created.

Evaluation

The evaluation of learning space design is complex. It is not surprising that published reports of comparative 'before and after' evaluation projects report 'no difference'. Key variables, such as fluctuations between student cohorts and changes in the curriculum, make accurate assessment of the effect of changing the teaching space impossible.

A more useful approach is to assess behaviours in the new space against the principles of the pedagogy intended – ‘do the intended behaviours actually take place’. One method for addressing this question involves observation of classes in action. Video recordings of classes, for example, provide a versatile data set which an evaluator can analyse for a range of behaviours, such as patterns of student-student and student-staff interactions. A second method is through surveys of students and staff, based on a predetermined set of questions about their experience of teaching and learning in the space.

Next generation learning spaces

New space developments at UQ include collaborative spaces such as the Collaborative Teaching and Learning Centre at the St Lucia campus, libraries such as those at Ipswich and the Biological Sciences Library at St Lucia, and the experimental Advanced Concept Teaching Space (ACTS). It is perhaps unsurprising that libraries have been particularly progressive in this area. Not only has information technology had a profound effect through the shift away from paper and toward more electronic resources, library staff have long been very active in evidence gathering, evaluation, and re-conceptualising their role within institutions.

The Advanced Concept Teaching Space

Once complete, ACTS will be a ‘laboratory for teaching technology’. The aim, in essence, is to produce the teaching space equivalent to a ‘concept car’ at a motor show. That is, a collection of innovative ideas in one place that is never intended to go into production as a whole, but rather is provided in order to allow future users to interact with and respond to the various technologies and ideas on display. Once developed, ACTS will be a test-case used to identify those features which should be put into practice in learning space design. It is also intended to provide possibilities for rigorous evaluation, such as through video capture and analysis.

ACTS includes innovations such as polling via touch screens that are far more versatile and logistically simpler than the clicker-style audience response systems currently used. Technology in ACTS also provides for students to interact with presentation slides, and immediately obtain onscreen definitions or translation of selected text.

3.8 Children's designs for a future school

Dr Michael O'Donoghue (Reported by Dr Di Challis)
University Centre for Teaching and Learning, University of Canterbury, NZ

If children designed a future school, what would they design?

The opportunity

'With our new programme of rebuilding and renewal we have a once in a lifetime opportunity to transform schools that will inspire pupils with state-of-the-art buildings and facilities' (Millibrand, 2003)

'Ordinary classrooms can make pupils feel ordinary. Children deserve the best we can produce. They shouldn't be stuck in uncomfortable, inflexible buildings' (Gill Marshall Andrews, 2003)

Government investment in UK school buildings has risen from £683m in 96-97 to £3.8 billion in 03-04. Capital investment in UK schools reached £5.1 billion by 2005-06. Invited designers include Mark Barfield – London Eye and Wilkinson Eyre – Gateshead Millennium bridge. (DfES 2003)

The issues

Given this investment, there are three main questions to address:

- What should we build?
- Who should design it?
- How and where should we use technology?

Dr O'Donoghue evidenced his concern that some of the designs in response were unrealistic and undesirable with illustrations of designs that showed a few placid children in office-like spaces rather than lively spaces full of people. Further, at one point (but to a lesser extent now) technology was leading the debate.

The response

Dr O'Donoghue's response is to look at what best would constitute a school from the children's point of view.

With £10,000 support from the Lego Learning Institute who supplied Lego pieces from which the students created their schools, he has undertaken a program of global research involving 135 children aged 7, 8, 9 and 10 in seven countries.

- UK – 15 children
- Ireland – 16 children
- Sweden – 2 schools, 30 children
- USA – 2 schools, 8 children
- Canada – 10 children
- New Zealand – 2 schools – 24 children
- Australia – 1 school – 32 children

In response to the question 'where would you send your own children?', based on the response to this activity and impressions gained from working with children and teachers, the schools I've worked with in New Zealand would be placed first with those in Sweden in second place.

The procedure for school model construction:

1. **Sort the bricks into groups.** Otherwise children will think what the brick could be used for, not what they need to build their school
2. **Make a sketch.** A sketch provides an idea to discuss and then to plan what to do rather than blank stares
3. **Ask the children about the drawing.** When you ask **why** certain things are on the drawing, some children say 'dunno' - then they say their parent or someone else said it should be there. **TSK!!!**
4. **Chat to the children all the time they are building.** Idle chit-chat whilst building the models isn't as meaningless as it might sound. You learn an awful lot about **EVERYTHING** whilst engaged in hands on brickwork.
5. **Follow the children's instructions when building.** Help them to build their school - **BUT** they must give you instructions on what to do.
6. **Don't let parents or others interfere.** Somehow find a way of building with the children alone - adults always want to but in, and it isn't their game!

As the children built their schools Dr O'Donoghue listened acutely, watched closely and wrote notes as well as video recording. The students explained to their teachers what they were trying to achieve and universally these teachers were surprised by the level of creativity shown.

So, what do we know?

Has this research led to a shift in concept when we compare the designs by adults and the designs by children?

The research revealed a number of local and national effects including design, product and activity effects, and three international constants: ICT, café, recreation. A provisional ranking of the children's issues is:

- Recreation - Swimming pool / pools / play areas
- Security
- Range of eating venues - social spaces
- Teachers
- Classrooms / classroom layout
- CT / Computers – distributed & clustered
- Flexibility – time, style, and location

We need to create high quality spaces for children to play, socialise and learn. Children value their teachers and we need to support teachers with an appropriate pedagogy to work in these spaces. We need also to provide appropriate ICT/technologies to support the pedagogy as selected by children, staff, parents and other community stakeholders.

Application to higher education?

We need to create high quality spaces for students to study, interact and learn. Students value their lecturers. We need to provide a learning environment appropriate to pedagogy. Students and staff are stakeholders too. We need to include them and work towards active learning.

During the discussions following this presentation, several people pondered how this process could be transferred to the tertiary sector.

References:

Milliband D, School Standards Minister, DfES, June 2003

Gill Marshall Andrews, TES 2003

4. THINKING ABOUT FACILITIES, PLANNING AND BUILDING

In this section people who have had the opportunity to influence the facilities, planning and building of spaces within their institutions shared their experiences.

Mr Alasdair McClintock, the director of property and facilities division at UQ, believes strongly that desirable outcomes must inform the design of space. He called it a 'plan with civilising architecture' where spaces that are inviting and conducive to social interaction will bring about learning.

Mr Ron Hewitt (Manager, Planning and Development from Edith Cowan University) shared on the processes used to plan for a series of learning spaces including the award winning library at ECU, and the key issues in the process.

Dr Alistair Inglis and Mr Tom Loncaric (Victoria University) focussed on upgrading teaching spaces to a consistent and reasonable standard by making improvements in the day-to-day experience; advancing incrementally toward best practice and increasing the funds allocated to the enhancement of learning and teaching spaces.

Ms Lynda Wilem and Mr Wayne Reid from Deakin University presented on the re-design of the School of Architecture and Building design studio in order to enhance teaching methodology; applying principles of environmentally sustainable development, and ensuring the space is an interactive laboratory and research model for the school.

4.1 You can bring the horse to water

Mr Alasdair McClintock (Reported by Dr Henk Huijser)

Director Property and Facilities Division, The University of Queensland

Mr Alasdair McClintock began his presentation by acknowledging the input from Ms Iranthi Cabraal, Construction Project Manager at the University of Queensland. Mr McClintock then drew attention to the importance of both place and space. The importance of place refers here to the wider context, which includes the location, natural environment and heritage. In the case of the University of Queensland's St Lucia Campus, this incorporates the land and its proximity to the Brisbane River, as well as its historical position in relation to other Queensland universities. Mr McClintock showed a number of historical sketches and aerial pictures of St Lucia Campus to reinforce this point. He then referred to the ways in which technology has changed opportunities for designers to visualise their designs, as they can now create sophisticated 3D plans and outlines and use these in their negotiations and discussions with people who may not be literate in the reading of drawings.

Within the overall context outlined above, space needs to be contextual and friendly. In other words, it needs to facilitate a feeling of being 'at home' by providing spaces that are inviting and conducive to social interaction and thus to learning. Central to this is the idea of an integration of spaces, which can be achieved by focusing in the first instance on desirable outcomes, rather than design. This is not to say that design is not important, but rather that the design should be subservient to the projected outcomes. If design comes first, you run the risk of what Professor Keniger referred to as 'a collection of individually championed designs' which can be great in themselves on an aesthetic level, but which are about 'monuments' rather than about an overall experience and about learning outcomes. It is for this reason that Mr McClintock expressed his doubts about iconic buildings, as they have a tendency to focus attention on isolated pockets, rather than comfortably fit into integrated spaces for learning.

In the case of St Lucia Campus, the importance of heritage is embodied in the centrality of the Great Court, which can be seen as defining both the campus and the university itself, not simply as a 'monument' but as the living and breathing heart of St Lucia Campus. With this in mind, an important design objective is to make sure that it takes a maximum of ten minutes to walk to the core (the Great Court) from anywhere on campus. Thus, the importance of this central space is not up for discussion. However, this does not mean that this space cannot be modified or added to in the face of a changing student population and changing student characteristics. Again, a focus on objectives comes into play here, and Mr McClintock discussed the design of the café in the Great Court as an illustration of this point. In its design stages, this café met with considerable resistance, as it was seen as a commercial space that would 'desecrate' the character and identity of the Great Court. In short, it would diminish the monument. However, it was designed with two related objectives in mind. Firstly, it was projected to assist in breaking down social isolation, through creating a space that facilitates social interaction right in the heart of the campus, and by extension creating a sense of belonging. To incorporate the café in a space that is central to the university's identity can therefore be seen as a symbolic gesture. Secondly, related to the design of the café itself, the cafe was designed as a reaction to 'what the kids want'. In other words, it is designed as a space that has a familiar feel to young people, because it closely approximates off-campus spaces where they hang out. Overall then, the cafe provides students with a 'natural' environment in the heart of the university's campus, and is thus designed to simultaneously break down isolation and create a sense of belonging. Despite the initial charges of 'sacrilege', it apparently works very well and the café is now even frequented by those that initially expressed most concern.

It is this outcomes-based approach that informs the design of the overall campus. Mr McClintock called this a 'plan with civilising architecture', in which creating a sense of belonging is the primary focus. Thus, 'civilising architecture' involves an interconnected focus on integrating spaces as well as creating social spaces. The latter does not simply apply to spaces that are specifically designed for social interaction, such as cafes, but importantly also relates to installing benches in previously 'empty' spaces, which creates spaces where people *have* to talk to each other. The impact of mobile technology only exacerbates this need for transient space, at the same time that it diminishes the importance of fixed space, such as office space. In conclusion, if design is informed by outcomes, it is possible to bring the horse to water, and thus increase the likelihood that they will drink the water. In this way, design plays a central role in stimulating the overall learning experience.

4.2 A Case study at Edith Cowan University

Mr Ron Hewitt (Reported by Dr Caroline Walta)
Manager, Planning and Development, Edith Cowan University

Mr Hewitt spoke about processes used to plan for a series of learning spaces including the completed award winning Library building at Edith Cowan University (ECU) in Perth. The money for the project had been obtained from consolidation of several campuses into two.

Key issues in the process were: finance, the composition of planning groups and the importance of selection and briefing of architects and designers. Mr Hewitt cited the importance of 'getting the message across' to stakeholders when working towards change in learning spaces. Observation of what is going on elsewhere has been important to him and members of ECU, and to this end he expressed gratitude to the Carrick Institute for the grants which have allowed Queensland University to carry out innovative work in this area and to share it with others.

Mr Hewitt discussed some completed spaces, some works in progress and some plans for the future. \$36m per year has been allocated to fund building projects on 2 campuses of the university after the sale of a third campus. Joondalup campus is the site of some major projects including a new library, a health and wellness centre, lecture theatre and a new collaborative learning centre which is to be built in the old library. As part of the overall planning, opportunities are being taken to improve informal and formal spaces places, focus on access, places where students can sit and places where students can gather.

Observations of a range of learning spaces in other institutions have improved understandings about what is needed. Observations of universities in Australia has allowed for reflection about where and how to create informal learning spaces, about the use of flexible orientation within spaces of both staff to students, and students to students, and about the kinds of spaces which work now for tutorials and laboratories. A number of spaces built in previous times which appeared in some instances to ignore any underpinning pedagogy were presented.

Learning from others and their mistakes has been important. Mr Hewitt stressed the need to apply lateral thinking to the way learning can be presented. The ideas gained from UQ about use of space in the Biological Sciences and Ipswich general libraries, have inspired the structure of the new libraries at Joondalup campus. The ground floor of the award winning general library at Edith Cowan is an active open

space which contains a coffee shop, student services, computer facilities and opportunities for collaborative groupings, and throughways to other parts of the university. As the floors go up, expectations of lower noise and quieter learning increase. Opportunities on upper floors for break away areas and booths exist among the collections.

Mr Hewitt stressed that the process of planning, especially moving the debate forward, was greatly enhanced by borrowing from the best ideas of other institutions. Much time can be wasted in long winded discussion. It is preferable to get something on paper and use it to promote concepts. Briefing consultants is also critical. It is important to use architects who are interested in how the building is to be used rather than how it looks, who want to listen and have a strong interior focus. Another finding is that it is important to use images to show what you want to achieve; a strong positive focus with guidelines and images together with objectives.

The old library at Joondalup, existing as a robust four story space in an isolated location at the university offered challenging opportunities. The plan to turn a 600 square meter space into a collaborative learning centre was inspired by work at UQ. The starting point to get the project underway was the formulation of a clear plan and costings. As part of costing some of the elements of a collaborative learning space were considered. They included flexible learning spaces; flat floor space which is flexible and containing moveable tables and divisions, circulation spaces within formal spaces always containing technology, enabling lecturers to stop pause and gather information. Other features included storage spaces to ensure flexible floor plans, collaborative learning spaces, informal learning spaces, use of corridors, breakout groups for 6-8 people, spaces for individuals and small groups to work, bookable rooms, informal booth type spaces and semi tiered space for visibility in certain types of presentations.

This plan was presented as something to which people could respond to but was not be definitive. Mr Hewitt advised the value of striving to complete the job in its total conception and going all out to seek enough money for the total job from the start. When considering all costs (demolition, new building works, cabinet work, services, equipment and furniture, contingencies and other allowances) the total cost was \$864,000.

In summary, find the right consultants and bring the new generation academics of the future on board.

4.3 Developing and approach to upgrading learning spaces university-wide

Dr Alistair Inglis & Mr Tom Loncaric (Reported by Associate Professor Ian Reid & Ms Margaret McCafferty)
Senior Lecturer in Flexible Learning & Manager Educational Technology Support, Victoria University

The presentation by Dr Inglis and Mr Loncaric focussed upon upgrading teaching spaces to a consistent and reasonable standard from a poor base. The focus was on 'normal spaces' not special ones, these were to be everyday teaching spaces.

Their philosophy was to make a noticeable improvement to the day-to-day experience of all teachers and students, to advance incrementally towards best practice and to 'expand the size of the cake' and to increase the level of funding allocated to enhancing the quality of teaching/learning spaces.

As context, Victoria University (VU) is a multi campus institution that is less well resources than many others in the state.

Key outcomes were:

- IT and AV helpdesk were merged
- There was an increased focus on training
- Moved from lecture theatres to smaller spaces

About VU:

- Dual sector new generation university
- Multi-campus — 12 teaching campuses
- Significant resourcing challenges
- Strong commitment to student-centered teaching and learning
- Highly centralised management and timetabling of classroom spaces
- Strong cooperation between service areas (Information Technology Services, Library, Teaching and Learning Support, Student Services, Facilities)
- Single unit responsible for educational technology support for almost all teaching spaces
- Allocation of spaces based on capacity and facilities rather than location (buildings are not dedicated to faculties)

Following a merger with Western Metropolitan Institute of TAFE in 1998 they were faced with an increase in the number of campuses, TAFE courses, staff and teaching spaces. However, the teaching spaces were of a lower standard than those in the University at the time of the merger.

By 2005 progress had been achieved in the following areas:

- Minimum acceptable standards for teaching spaces were fully embraced by the university community
- All lecture theatres and all new teaching spaces, upgraded or built to minimum standards
- Support services were integrated into ITS Helpdesk facility
- Training in use of technologies in teaching spaces was introduced
- From anecdotal evidence, staff satisfaction levels were greatly improved

The next challenge was to bring lecture theatre capabilities to small classrooms

Electronic classroom initiative

VU successfully applied for 16 e-classrooms (total \$186,000) under the 2006 Commonwealth Equipment funding program, special category 'electronic classrooms'.

Electronic classroom specifications were:

- Data projector
- Teacher's workstation
- Installed PC
- Laptop connectivity
- Intranet and internet access
- Wireless networking
- DVD/VCR

- System controller

A space information system has been developed: articulating accomplishments to date through a university-wide room audit, and compilation of audit data, and commissioned development of a database. Also planning for the future. Next steps are to link the space timetabling system with room facilities database, link maintenance functions and make information available to all staff via the University intranet

What has been achieved so far:

- Strong commitment from senior management
- The term 'e-classroom' is part of University vocabulary
- E-classrooms are standard components of all new major capital projects
- Unexpected sources of funds have shown up
- Funding is no longer the greatest challenge

The next stage is the development of second generation e-classrooms that go beyond adding technology to a standard room. The aims are:

- Increased flexibility
- Support for collaboration
- More appropriate furnishings (pods, chairs, better writing surfaces)
- Improved ambience
- Improved laptop support

VU is now looking at other issues e.g. furniture which could further enhance the student experience. Projectors and PCs are the main components demanded. They are looking at best practice and principles for future upgrades and will develop experimental spaces for new developments.

4.4 Learning through experience

Ms Lynda Wilem & Mr Wayne Reid (Reported by Dr Di Challis)

Senior Projects Architect, Property Services Division & Business Manager, Campus Planning and Design, Deakin University

Background

Ms Wilem and Mr Reid from Deakin University presented a case study from their institution: the School of Architecture & Building design studio, level 4 of the Geelong Waterfront campus. The original Woolstore building was constructed in 1893 and redevelopment by Deakin commenced in 1993. The project cost was \$1.3 million and the construction period was over seven months in 2003/4. The floor area is 1,070 sq metres.

As a listed building, the existing façade had to be retained. Some other original elements such as the timber floors were also retained 'because they were doing the right thing for us'.

Previously students worked within their year level in eight individual design studios of 60-80 square metres. Identified weaknesses were a lack of communication between year levels, lack of space, and lack of flexibility in allowing for expansion and contraction of class size.

Project objectives

To enhance the teaching methodology of the School, encouraging vertical integration through the design study program (five year levels)

The application of Environmentally Sustainable Development (ESD) principles was a fundamental objective of the project.

The space was designed as an interactive, living laboratory and a research and study model for the School's Built Environment & Research Group.

These objectives were strongly driven by both the School and the University's Property Services Division.

The **functional brief** was as follows:

- An academic teaching space in the form of an open plan design studio for architecture students, years 1 – 5 (approx. 300 in total)
- An exhibition/ function space for up to 400 people
- Maximum flexibility for multiple activities- planned and ad hoc
- A/V and data enabled
- The space was to be an active ingredient in the learning process.

The final point is especially relevant and important for Architecture students. Students would actively pursue an environmental agenda and learn in an active, participatory way.

While the intention was to provide space for a range of activities, it was realised from the outset that some of these could be predicted and some could not. Hence the key was to build in flexibility as needs changed over time.

The School wanted to maintain the industrial feeling and scale of the space. The emphasis was on the provision of mechanical services and security allowing 24 hour access. Cat walks in the ceiling space allow students to see all the components of the mechanical services and how they are integrated and operate.

Ecologically sustainable development (ESD) principles

An important addition and integral part of the project team was the School's Built Environment Research Group (BERG) who provided ESD input in conjunction with the architects (McGlashan Eversit) and the engineers (Waterman AHW). Funding was received from the Sustainable Energy Authority as a part of the Victoria Solar Innovation Initiative.

ESD was approached from a number of directions according to the opportunities presented by the existing building conditions:

- Adaptive re-use of existing building stock.
- Minimising capacity of mechanical plant required.
- Minimising energy used by lighting system.
- Minimising heating and cooling loads on the building.
- Energy monitoring and management.

The project team liaised with OHS and the School to establish a temperature range of 21-28 degrees almost entirely through natural ventilation, thermal chimneys and ceiling fans. Each light is individually controlled with its own sensor. Energy metering and monitoring allows energy consumption to be tracked by students and staff. This is a learning, research and building management tool.

While there are written instructions, there are also cultural protocols (eg over the use of lights) and there is considerable understanding amongst students (eg if a group is raising the temperature in an area for an ESD experiment) who work together within the one environment.

Now that it is operational

The School could not simply move in and operate. Lecturers had to adjust how they taught. Some found the background noise challenging to handle so this wasn't the right solution across the board but increasingly more lecturers are embracing this way of teaching.

Because students at all levels work in the one space, students in early years can see what can be produced in later years and sometimes more advanced students are challenged by ideas and comments from entry students. It is believed that the quality of work throughout the School has substantially improved.

Incorporating a social space was also important and students use the space, feeling comfortable just to hang around.

From a very open, simple space, in one sense, the design studio is a very complex space that creates important learning opportunities.

5. AUSTRALIAN DEVELOPMENTS AND THE USE OF SPACE

Recent Australian developments offer the sector opportunities to learn from the real experiences, challenges and solutions of people who have led the design or refitting of a place.

Associate Professor Peter Tregloan (School of Chemistry, The University of Melbourne) presented on the thinking and planning processes which resulted in the re-design of a learning space at the School of Chemistry. He emphasised that stakeholders need to ask questions and analyse their own needs, problems and desired outcomes when planning the redesign of learning spaces.

Mr Ashley Halliday (Senior Associate, HASSELL) worked with Flinders University on the design of two new learning centres for the Faculty of Health and School of Education. Mr Halliday explored the designs and commented on key features of the learning centres.

Dr Garry Leadbeater (Engineering, Curtin University of Technology) outlined the issues faced by engineering faculties. Curtin's response was to strike a balance between industry demands for scientific knowledge and technical skills, and interpersonal communication skills in the workplace through the Foundation Year Studio.

Associate Professor Gordon Sanson (Head of School of Chemistry, Monash University) touched on how labs have historically been grossly inefficient and cluttered. He also shared on the process undertaken to determine the wants-and-needs analysis of students and the school, and design labs to accommodate emerging technologies.

Ms Peta Drury (School of Nursing, Australian Catholic University) described the transformation of the Bachelor of Nursing Curriculum into a scenario-based educational model through the creation of two interrelated learning spaces.

Ms Marion Wilson (Associate Librarian, The University of Newcastle) shared her experiences from the development and evaluation of a major library redevelopment.

Associate Professor Adam McCluskey (Faculty of Science and Information Technology, The University of Newcastle) championed the design and building of new chemistry laboratories.

Ms Shirley Oakley (Executive Director, Library, Charles Sturt University) discussed the establishment of a learning commons to address the need to provide flexible learning spaces that meet 21st century demands.

5.1 The Learning Lab

Associate Professor Peter Tregloan (Reported by Dr Caroline Walta)
School of Chemistry, The University of Melbourne

Associate Professor Peter Tregloan, presented the thinking and planning processes which resulted in the redesign of a learning space in the School of Chemistry at The University of Melbourne. With around 1500 students in Chemistry, significant numbers would be impacted by any change. As the change could have also had a negative outcome, strategies for constant evaluation of any developments undertaken were required. A decision was made to work within the existing course structure, which involved a combination of large group lectures, laboratory classes and tutorials, with the targeted change being initially directed at tutorial space. Previously, tutorials involving 50 students had taken place in small lecture theatres designed for 100 with little opportunity for student collaboration. One of these was transformed during 2006 into 'The Learning Lab'.

Planning of the new learning space involved a cross-section of stakeholders, including those involved in curriculum, learning space design, project management, management of spaces and architects, working through what the space had to achieve. This group set the brief for the new learning space: to cater for group and active learning as a central feature of a first year program, for improved opportunity for staff/student interaction and for students to develop abilities to work and present solutions to problems. The brief requested that the potential for technology to enhance outcomes was to be exploited. There was a commitment throughout the planning and implementation of the new learning space to keeping teaching staff informed about all aspects of the project.

The newly modelled 'Learning Lab' opened in February 2007 and is in operation five days a week, 9am-5pm every day. Changes in level, imposed by the original tiered lecture theatre, became five learning zones on three levels, accessed by steps throughout the space. The new design allowed for groups of up to eight students to collaborate in these flexible zones. Tables are designed around a rotating point and can be moved to accommodate two groups of four in each zone. Through the rotation of the table tops, spaces can be created to allow staff to sit among students within a group as part of supervision and interaction. At the same time use of technology through LCD screens, document cameras and PC's placed within zones allows students to access and process information and communicate it to other zones.

Concurrently with the construction of the space, work commenced on rethinking the tutorial program. Revised activities needed to be developed and this work is ongoing and expected to be completed during 2008. This has included changes in staffing arrangements - using two people for each class. Subject tutors, a number of whom have been senior secondary school teachers recruited as part of the chemistry first year transition program, now work in collaboration with post graduate tutors in these classes.

With the learning space now in use, post occupancy evaluation is considered a vital component of the project. A policy of developing programs that exploit the available technology and the potential for use of the space is in place. The use of Keypad personal response systems has worked well, to obtain anonymous student answers to short quizzes during class. Using a DV-cam, small-scale demonstrations at the 'drops of solution' level can be presented, although it is stressed that the space is not a lab. As part of the flexible use of the space, a lecture/seminar style can also be utilised if it is appropriate. The capacity to video conference between groups on the campus also exists to highlight the importance of working in research

networks. The ability to remotely observe teaching and use of the space is also a possible mode of evaluation for later research.

Access for disabled students has been addressed through a doorway to the lower area of the tiered room. Associate Professor Tregloan acknowledged potential future issues with free movement around the room for disabled staff might need to be addressed. In discussion, he also addressed comments about student safety with the steps, where students might step backwards, forgetting that the floor dropped away. This had not been a problem with the use of the room over the period it had been in operation; 'rumble strips', similar to those provided for vision impaired people in other places, mark changes in level.

In his advice to the audience at Perth, Associate Professor Tregloan highlighted the importance of ensuring a budget to enable and educate academics to develop and use technology appropriately. At The University of Melbourne, a fund of \$13 million dollars was allocated between 1997 and 2002 to support staff to develop resources using technology for their teaching programs. This initiative had resulted in the funding of 250 projects across all faculties.

Associate Professor Tregloan stressed that the 'Learning Lab' solution set out to address the needs of a particular situation. It was important that stakeholders ask questions about their own specific needs, problems and purposes when planning the redesign of learning spaces. Solutions should flow from this analysis and rather than the simple adoption of what has worked in some other place.

5.2 Undergraduate chemistry labs

Associate Professor Adam McCluskey (Reported by Dr Henk Huijser)
School of Environment and Life Sciences, The University of Newcastle

Associate Professor McCluskey works in the Faculty of Science and Information Technology at the University of Newcastle, and functioned as the 'champion' behind the design and building of the new chemistry laboratories for this faculty. Associate Professor McCluskey began by explaining what is involved in the management of such a project, and suggested that it is a steep learning curve which requires a strong commitment. In the process he highlighted the vital role that champions play in seeing projects through from their inception to their eventual use. In his presentation, Associate Professor McCluskey outlined the various stages of the design, and the many questions that needed to be posed at each interval. The initial impetus for new chemistry laboratories came from a recognition that the old ones were dark, smelly and not particularly safe spaces. But more importantly, they were not conducive to a satisfying learning experience for students, because they were not spaces were students wanted to be. Similarly, they were not adequate for flexible and innovative teaching methods, for example because the vision across the entire space was obscured.

The considerations for the new chemistry laboratories were initially based on the fundamental recognition that students' needs have changed. This raised a number of questions. For example, do we build to budget? Do we build to a need, both in terms of student need and in terms of sustainability, by projecting fifteen years ahead? What should be put in? And what should be left out? With regard to student's needs, what do current chemistry students require, and what are the outcomes we are trying to achieve, and where do these overlap? Moreover, is it enough to consider current needs or do we speculate about future needs? The way to get there is to develop an initial plan, possibly with an architect on board, which includes the

actual practical requirements, including dollars. This plan needs to include a clearly articulated, evidence-based need, for the next step is to convince the university hierarchy that this need is real.

The plan in the University of Newcastle's case included a fairly long list of considerations and characteristics for the new facilities. They had to be open plan; the lighting was important to make them attractive and comfortable places to teach and learn in; they needed to provide easy access to facilities and storage; they needed to be able to facilitate a variety of innovative and flexible teaching strategies; the overall spaces needed to 'inspire and enthuse' with adequate resources; and they needed to provide easy access and address occupational health and safety standards. Overall, the idea was to create a quality teaching environment, based on the following role description of universities in general: 1. teaching, 2. research, and 3. administration. Associate Professor McCluskey made it clear here that in his opinion, the order is no coincidence. In other words, if universities are teaching institutions first and foremost, then spaces for learning and teaching are of primary importance, and thus warrant institutional investment to ensure that they facilitate optimum learning outcomes. The above mentioned need to inspire and enthuse is particularly relevant to science students, keeping in mind a wider societal need for more science students. With this in mind, it was decided that the main focus should be on first year students, as postgraduate students were arguably less in need of stimulation. This is of course partially related to finding a balance between budget considerations the most pressing needs.

The laboratories were designed according to functional needs:

- Level 10000 as multipurpose
- Levels 1000 -3000 with state of the art AV
- Level 4000 – world class wet chemistry research facility

5.3 Curtin's engineering Foundation Year studio

Dr Garry Leadbeater (Reported by Dr Caroline Walta)

Academic Director – Engineering Foundation Studies, Curtin University of Technology

Dr Leadbeater outlined the issues facing engineering faculties in higher education namely the balance between industry demands for scientific knowledge and technical skills, and for interpersonal communication skills in the workplace. Curtin's response has been the setting up of a foundation year which focuses on the development of general skills and attributes rather than subject specific knowledge and aims to address the pressures on the Engineering Faculty to solve the problem of balancing technical/scientific with the interpersonal developmental demands of industry for graduates by the end of the courses offered. In order to deliver the behavioural outcomes associated with this new structure Curtin has funded a new learning space, the Engineering Foundation Year Studio, which attempts to address the physical and social needs of this first year group. The outcome is that although students still participate in lectures and tutorials, much foundation material occurs through group work in the studio area.

The project studio has been in use for four years and is subject to continuous review. However, in general it is achieving set outcomes. Getting the experience right for first year students involves opportunities for adaptation, assimilation, participation and achievement. These were the aims of the foundation year.

The new studio occupies 1100 sq metres on the third floor level of an existing building. This floor is now for the exclusive use of first year engineering students. The studio designed for 480 students is now

accommodating 550. With school transition a focus for many, the brief was to present features with a sense of home, together with purpose built labs, computer access, storage and real life open space studio which looks like the work place and allows for student interaction – engaging with, learning from and teaching each other.

To this end, the space contains defined areas for social contact which articulate into a general area where students can mix with non first year students. The remainder of the space consists of purpose built laboratories (mechanics and electrical systems) which are timetabled for classes and locked, and computer labs (two each accommodating 20 students) which can be timetabled but are open to all. Small group withdrawal spaces have been created which are glass fronted and fitted with computers and whiteboards. Other features of this space include access over seven days from 8 a.m.- 11 p.m. supported by access cards and security cameras, with LCD screens constantly updating students about 'news' and other relevant information.

A feature of the learning in this space is the paid hire of higher level students during set hours who are available to first year students to assist with problem solving associated with project tasks or specific units being undertaken. Another notable feature is the presence of cross faculty support with aspects of the program being addressed in subjects from humanities (e.g. communication) and science (maths engineering sciences) involved.

5.4 Designing laboratory teaching spaces for the future

Associate Professor Gordon Sanson (Reported by Dr Di Challis)
Head of School, Faculty of Science, Monash University

A laboratory is a 'building set apart for scientific experiments'
M. L. *laboratorium* 'a place for labour or work'
L. *laborare* 'to labour'
L. *laboriosus* 'toilsome, wearisome, troublesome'
laborem 'toil, pain, exertion, fatigue, work'
perhaps originally 'tottering under a burden' related to *labere* 'to totter'.

And it is to laboratories that we bring our brightest young minds!

Associate Professor Sanson introduced pandas as a paradigm for universities. Both pandas and universities are endearing curiosities and make the world a better place but they are poorly adapted and in danger of extinction. In their territory pandas (like academics) are defensive and antisocial but out of their environment are cooperative and playful. Both have limited goals: research or teaching; feeding or sex.

Brief history of the Biological Sciences Laboratory

The design process

Labs historically have been grossly inefficient and cluttered. In response, Associate Professor Sanson first asked staff what they wanted and when this was unproductive (gas taps that they don't use but they might!) he analysed practice to determine what facilities were used - and really needed. He drew on student focus

groups and consultations with an engineer and project manager and he engaged the whole school with sketch maps and meetings.

The physical and digital facilities would be integrated.

In the development of physical facilities, as a result of the analysis of practice, the following changes were made to the lab:

- Rationalised taps, gas, air, vacuum, power
- More flexible dry work areas were provided
- Wet areas were separated and more flexible sink and draining areas provided
- Sliding walls were incorporated to provide various combinations of fume cupboard access and class sizes. Although expensive, sliding walls have meant that space can be used far more effectively.

From exploring the environment adjacent to the labs, windows were incorporated despite reluctance by some staff that they could be seen teaching. This has had a profoundly positive effect on those teaching as well as those who now intentionally walk by to see what the students are doing.

Digital facilities

The key question regarding technology is 'What do we want to do?', rather than 'What can we do with what is on sale?' With the need to replace old but serviceable microscopes, the quote was for the 'twenty-year' microscope. But how will we be teaching in 20 years?

The Lab was designed and built to accommodate emerging technologies. Australian Instrument Services and Motic (China) were engaged to develop what we wanted: Motic microscopes with analogue video cameras already were widely used but digital systems were only just emerging and these were fully developed in this laboratory.

Digital video systems

The design incorporates the ability for students to display images on adjacent monitor and two-way transfer of data.

Issues

- Each station requires a PC
- Cameras linked by IP address
- Wireless possible - but bandwidth limitations

The solution was to employ a hybrid model with the intention of moving to complete wireless across the web in time.

Having decided to install individual PCs a host of new opportunities came on stream. For example, images from student work can be projected and shared by the group so demonstrating practice and stimulating discussion. Student progress can be monitored via the teacher's workstation and assistance offered discretely. Image sharing allows an appreciation of specimen variability, better understanding of the specimens, and the saving of images to student portfolios. Student data can be collected and analysed immediately. Groups can share findings that lead to new questions. This has radically changed the way we teach microscopy, traditionally an isolating experience.

Technology now is an aid - not an end in itself.

- The technology enables
- The technology is for a purpose
- The technology is now taken for granted

Students have engaged with the laboratory and have been empowered to try new ways of learning. They appreciate that they have something special and understand and are tolerant when something fails. Staff have engaged with the laboratory and have been empowered to try new ways of teaching (audience response systems drive competitions, surveys, etc). They are more opportunistic and embrace novel situations, request enhancements and are thinking of the next generation.

The next generation

What will be the next generation of opportunities? Can we influence that? Possibly more than we dare to think!

The future will see Intel – USB 3.0 in 2008 (10 x faster) with current hard-drives, mouse and printers too limited to make use of the new 4.8 Gigabit/sec bandwidth. ‘Nanotechnology will be an agent of change as great as the transistor which delivered the modern IT era’ (Miller 2007).

‘We are all talking about the next big driver for semiconductor demand beyond the handhelds. A good candidate is ubiquitous computing, where we take the system per person ratio beyond the handhelds to a point where each person might be interacting with hundreds of small, wireless networked systems’ (Jin Lee, Semiconductor International, 2/1/2007, <http://www.semiconductor.net/article/CA6409505.html>.)

We should strive for flexibility and simplicity by:

- Providing clear spaces to spread work on
- Providing more cable access than anticipated and prepare for wireless

The laboratory will increasingly be where the student is. We need to strive for simple, workable functionality to achieve what we want.

References:

Miller B, Herbert Hoover Professor of Public & Private Management, Stanford University, Sydney Morning Herald, February 13, 2007.

5.5 The Virtual Health Environment (VHE): Creating learning experiences that are based on ‘true to life’ clinical scenarios

Ms Peta Drury (Reported by Dr Kerri-Lee Harris)

Lecturer, Acute Care / Critical Care Nursing, School of Nursing, Australian Catholic University

Ms Drury described the transformation of the Bachelor of Nursing curriculum through a move to a scenario-based educational model. This approach was enabled through the creation of two interrelated learning

spaces: a simulation clinic, complete with technologically sophisticated patient models; and a supporting website with links to a range of online tools and resources.

Universities offering professional degrees such as Nursing face increasing challenges in providing students with sufficient and high quality clinical education experiences. Various subject areas compete for space in a crowded curriculum, and therefore time in hospitals on clinical training is placed under pressure. In addition, it is increasingly difficult to find appropriate placements for all students, given the competition for hosts from a growing range of health practice studies.

The Virtual Health Environment (VHE) approach developed by the Australian Catholic University aims to address both these challenges, and thereby ensure that nursing graduates enter the profession as 'clinical nurses who are competent, knowledgeable and able to respond effectively to the rapidly changing health care environment'.

Scenarios as the basis of an integrated curriculum

The Bachelor of Nursing incorporates studies in a range of discipline areas, and involves a large number of teaching staff. Problems that can arise in such situations include: limited encouragement for students to draw together their learning from disparate parts of the course, uncertainty on the part of staff about what students have learned or heard elsewhere and, therefore, uncertainty among students about what is expected of them.

The VHE is based on a series of scenarios, covering a range of topic areas. Because they are based on real health situations, the scenarios are necessarily complex and illustrate numerous concepts, knowledge areas, and skills. In this way the scenarios create a learning environment that is integrated and authentic. Staff teaching on a core element of the degree – the Contexts of Nursing Practice (CONP) units - are required to align the content of their teaching with the relevant scenario. The influence of the VHE on curriculum integration is extending beyond the CONP, as staff teaching in other subject areas elect to link the design of their material to the CONP scenarios.

Prior to the introduction of the VHE, the clinical learning tended to be strongly skills focussed. It was difficult to 'encourage staff to realise that clinical education needed to be more than simply skills in taking patient temperatures'. With VHE, students clearly need to understand and engage with the complexity of real situations. In addition, they learn to value collaboration and reflection.

The VHE simulation clinic – and lessons learned

The simulation clinic is a six-bed facility equipped with models which are able to display a range of symptoms and conditions. This provides a valuable opportunity for students to spend time each week in a clinical environment, integrating their lecture and tutorial based learning with hands on experience.

This is an expensive learning space to establish and maintain. Each model costs approximately \$30,000, and around 16 are required to cover the various simulations.

Simply devoting resources to the establishment and maintenance of the clinic is not enough, however. For the learning to be effective, specialist staff need to be involved in clinical teaching. Laboratory technicians are skilled in servicing the equipment, but are ill-equipped to create the scenarios in the clinical setting. High staff turnover among laboratory technical staff further compounds this problem, as new staff must be trained in working with the models.

Given the resource intensive nature of the VHE clinic, it is essential that the time students spend in the clinic is spent on appropriate learning activities. If students are scheduled to a clinical session without first having developed the prerequisite knowledge, staff can tend to spend the clinical time giving a tutorial – an activity much better undertaken elsewhere.

The VHE website

The VHE website supports students learning throughout the three years of their degree. In addition to presentation of the patient scenarios and directions for activities to be undertaken in the clinic, the site also provides links to a range of relevant resources. These resources include those actually used by practicing clinical nurses, such as databases and policy documents relating to state-based health legislation. In this way the VHE develops students' professional literacy and problem-solving skills.

The developers of the VHE website encountered the following challenges in its development:

- Gaining access to the relevant professional databases and resources. These are provided by a range of professional organisations and institutions, and therefore access for university students needed to be negotiated and then technically-enabled.
- The website needed to be designed in such a way that its use was self-explanatory. Devoting class time to teaching students how to use the website would mean that opportunities for more meaningful class-based learning activities would be lost.
- Finding the appropriate host server for the website within the University's information structures.

The future of the VHE

The power of the scenario-based approach to curriculum design provides an opportunity to renew curriculum through an evidence-based approach. Scenarios can be refined to ensure that they fully and accurately reflect real conditions, and a range of real conditions, based on clinical evidence. In addition, research into hospital incidents can be used to identify the most prevalent treatment problems and errors that happen in hospitals. Well-designed scenarios can be used to teach students how such situations can be overcome or avoided.

5.6 Creating places that stimulate the senses and promote human potential – recent design strategies

Mr Ashley Halliday (Reported by Associate Professor Ian Reid)
Senior Associate, HASSELL

Architect Ashley Halliday worked with Flinders University on the design of two new learning centres for the Faculty of Health Sciences and the School of Education. Through slides Mr Halliday explored the design of the new facilities, which include offices and teaching spaces and laboratories.

Key features include:

- A focus on the environment and ecologically sustainable development principles, evident in the climate-responsive way the building addresses the site and harnesses the elements to minimise energy consumption.
- Transparent, welcoming and legible central atriums, the hub of each building, which are selectively protected from the elements, light filled, allowing fresh air ventilation and promoting the interaction of building occupants, (moving away from cloister models on which previous buildings had been based)
- Movable walls and retractable seating to reconcile the conflicting demands for flexibility and dedicated space, and usage of outdoor spaces for teaching purposes. The designs seek to unbind the learning environment and form less formal and rigid learning spaces that are more adaptable and responsive to individual learning needs and the inevitability of change.
- Clean cut and crisp design intended to reference intrinsic values embedded within the campus planning heritage and developing a contemporary and unique design quality that is representative of the University's cultural values and aspirations.

5.7 All day, all night – the impact of the Auchmuty Information Common on student learning

Ms Marion Wilson (Reported by Dr Kerri-Lee Harris)
Associate Librarian, Corporate and Library Services, The University of Newcastle.

Ms Wilson described the development and evaluation of a major library redevelopment at the University of Newcastle. The Auchmuty Information Common (AIC) is a refurbished space within an existing library building, selected on the basis of its accessibility, and costing around \$0.5M to develop. It opened in 2003. The AIC provides 24/7 access to an informal environment conducive to collaborative study, well-equipped with computers and access to electronic resources, and where assistance from staff is always available. There is also a café, patronised by both staff and students, which further transforms this from a traditional library space into a more relaxed and social environment.

The presentation described the drivers behind the AIC development, and the results of a recent large-scale survey of users of the AIC. Nearly 800 AIC users participated in the study, describing their patterns of use and perceptions of the AIC in supporting their learning.¹¹

The principal themes developed in the presentation are described below.

Drivers for change

The diversity of students studying at the University of Newcastle was one of the drivers for the AIC development. The students are diverse in their preferred styles of learning and in their patterns of behaviour. Only 40 per cent of 2007 first year intake was school leavers. The University's undergraduate students include many with parental responsibilities and work commitments. More than one in four are from low socio-economic backgrounds. Approximately two per cent of the student intake is indigenous, studying across a broad range of programs from indigenous studies to medicine. Distance learners, although small in absolute numbers, have specific requirements for information access and the library is heavily involved in supporting flexible and online teaching delivery.

The diversity of library users extends beyond the diversity of the student community. The libraries at Newcastle illustrate the strong connection between the University and the community. The University library collections include regional business, personal and institutional archives, and also provide support to regional health services libraries and school students.

A second important factor behind the AIC project was the need to ensure library staff time was used most effectively. The number of library staff declined by around 40 per cent in the past decade, yet student numbers increased. During this time, the increasing electronic access to information was a key factor in changes to university library operations. Automation of many library services provided time for staff to develop a range of projects and initiatives.

The third motivation for developing the AIC as an informal space was the recognition that, increasingly, students' social, work and study activities are merging. Traditional spaces that purposively separate these activities are becoming less appropriate to the needs of students.

The AIC project sought to:

- Better support students' access to online and other library resources
- Provide a facility that supports the needs, both scholarly and social, of a diverse student cohort
- Encourage collaboration among students
- Support blended-learning

Staffing the AIC

The 24 hour /seven day staffing of the AIC has proven to be a highly-valued feature of the initiative. There are information desk staff available 8am-10pm. In addition, IT support staff – referred to as 'rovers' – are available 24 hours a day and, as they are students themselves, are well aware of the needs of the AIC users. There is also a reference service provided by email, sms and telephone, and the 24 hour access to

¹¹ University of Newcastle Library Services. *Supporting Teaching and Learning in the Information Common : User Survey August 2007.*

this has been a boon for offshore students in different time zones, as well as to distance education students within Australia.

Learning from the initiative

The design of the AIC was based on recognised principles of good practice in undergraduate teaching, and there have been attempts to evaluate the success of the facility using these principles as criteria. In the absence of more objective and reliable evidence, however, students' self report of their experience of using the space has been used as the principal evaluation strategy.

In the past, students have been surveyed about their experience of library services and have indicated that they value the help they receive from library staff. A recent evaluation of the AIC however showed that students require more from such a learning space than helpful, personal assistance.

The survey referred to earlier drew responses from 783 AIC users, 84 per cent of whom were undergraduates and nine per cent were postgraduate, gave the following results:

Students rated the 'most beneficial aspects' of the AIC to be:

1. Computer/IT access;
2. Environment;
3. 24 hour opening ;
4. Fast internet.

These were rated more highly, by most students, than were the café, the location, or staff availability. Three hundred respondents indicated that they had no access to the internet at home. More than half the students surveyed had spent late nights in the AIC at least once, and one in three reported having been there between 3am and 8am. Staff were well aware that the 24 hour access was valued by some students as since opening, the AIC has never been empty! However the high proportion of students who took advantage of the late hours was a surprise.

The reasons given for studying at these hours included convenience, computer and internet access, and the 'good study environment'. Very few students cited problems with workload as a reason for late night use of the facility.

Nearly all respondents indicated that the AIC had improved their university 'performance'. The most common explanations for this were the 'environment' and the access to IT, assistance from staff, and other library resources.

Most respondents also reported positively on the effect of the space upon collaborative learning. The reasons given again included the 'environment', generally, and 'computer layout' and 'technical resources' more specifically.

Currently, users have 24/7 access to the AIC only. The upper floors of the library are locked after 10pm. Students' positive reactions to the extended hours of the AIC have, however, triggered a review of this policy and it may be that the AIC has a 'flow on effect' to other areas of the library.

One observation from the survey suggests that location may have an effect on the use of the AIC. Students from Faculties located nearest to the AIC building are over-represented among AIC users, according to the pattern of survey responses, while the converse is true for more distant faculties. Location of such centres is, therefore, an important planning consideration.

5.8 Learning space without walls: the CSU Learning Commons Concept

Ms Shirley Oakley (Reported by Dr Henk Huijser)
Executive Director, Division of Library Services, Charles Sturt University

Ms Oakley is Executive Director of the Division of Library Services at CSU, and her presentation discussed the establishment of a Learning Commons. This is designed to address the struggle to provide flexible learning spaces that meet 21st century demands. Spread out over eleven campuses across New South Wales and ACT, Charles Sturt University has traditionally had a strong focus on distance education, which was traditionally characterised by large amounts of print materials. The current objective is to try to eliminate physical and virtual 'walls', and to develop a service continuum which Ms Oakley referred to as 'service without walls'. This incorporates online learning environments such as My.CSU and CSU*Interact*. The important point here is that these environments should be student-centered and focused on functionality, rather than characterised by an organisational focus. In other words, students should be able to access services and support without the need to understand institutional structures.

To facilitate this type of accessibility, student support should be organised along a continuum that runs from administrative support to learning support, rather than a series of organisational bodies that operate in their own separate silos. Ms Oakley identified different tiers of support, where tier zero is self help; tier one is first line support; tier two is specialist support; and tier three is in depth support and assistance with critical incidents. The service continuum runs across these tiers, with administrative support including student administration, finance, residences and catering, health and IT internet payments, while learning support constitutes library services, indigenous support, learning skills, disability support and IT 'help desk' support. This applies to both online and on campus learning spaces, but Ms Oakley focused primarily on the on campus learning spaces, and particularly on a new learning and teaching precinct at CSU, which includes a new learning and teaching hub and a new learning commons building. Together with lecture theatres, the student association café/bar, and the quadrangle, this is conceptualised as a 'pedagogy space map', which again is seen as a continuum of learning spaces, rather than distinct and separate entities.

An elaborate learning strategy was developed for the learning commons building at CSU's Bathurst Campus, with different zones designed to facilitate different types of learning, such as social, group-collaborative/interactive, group-creative/presentation, and individual study. While these types of learning are conceptualised as needing distinct types of spaces, they 'bleed' into each other along a continuum, which is an effect of how the actual learning commons building is designed. Anticipated noise levels associated with these different spaces are an integral part of this design. In addition, support services are mapped across these spaces and are positioned, in both automated and face-to-face modes, in spaces which are directly relevant to the various types of learning. This model also means that the learning commons building is an inclusive and accessible space that includes spaces for flexible teaching, learning spaces for parents with children, spaces designed for multimedia meetings, student computer lounges and display lounges, and staff meeting rooms, while there are library services available as well as student services, print and copy utilities and so on. All of this is reflected in the layout of this building.

Overall, the new learning commons is designed to accommodate self-directed learning, non-facilitated collaborative learning, simulated learning, facilitated learning, presentations and small lectures, and remote teaching (video conferencing); it thus has a clear student focus. Indeed, the aim of the design is to actually keep academics out as far as teaching space is concerned, so that students have a sense of 'ownership' of the building. By contrast, the new teaching and learning hub is more designed for facilitated learning and teaching, with differently sized lecture theatres and collaborative learning spaces. As part of the overall learning and teaching precinct however, they are connected and together form a continuum. The quadrangle conveniently houses a café, so that it provides an informal space for impromptu meetings between academics and students. The learning precinct is designed for a projected ten year growth.

In the final part of the presentation, Ms Oakley discussed Michael Habib's Academic Library 2.0 Concept Model. The key to Habib's model is a combination (or rather a continuum) between face-to-face and computer mediated spaces to facilitate various types of learning interactions. This closely approximates the learning commons discussed above in that it runs along a continuum between informal, intimate peer interaction and formal, serious and scholarly communication; between loose power structures and hierarchical power structures; and between social and academic type activities and learning interactions. In this model, the library is conceptualised as occupying a space in the centre of this continuum, and thus facilitating considerable overlap between the two ends of the spectrum. In addition, this model allows us to conceptualise the increasingly intertwined connections between physical and virtual places and spaces for learning.

In conclusion, Ms Oakley reiterated a point made by other presenters: that designing places and spaces for learning is about the learning experience and therefore about learning outcomes, *not* about the technology in itself. In other words, technology should be an integral part of the design, but only insofar as it ultimately supports the learning experience by breaking down the walls.

Reference:

Habib, Michael C.: *Toward Academic Library 2.0: Development and application of a Library 2.0 methodology*- Masters Thesis, November 2006, School of Information and Library Science, University of North Carolina at Chapel Hill, <http://hdl.handle.net/1901/356>, accessed 20 September 2007.

6. FOCUS ISSUES

Following the presentations, participants at each seminar were invited to reflect on the following questions.

- What will learning be like in 2015?
- What will students be like in 2015?
- How can we enable more creativity in our students and staff?
- How can we use building/space to change/enhance the education experience of students?
- How can institutions ensure that the spaces developed today promote best practice in learning and teaching?
- How can institutions ensure the spaces developed today will still be useful later in their life cycle?
- How do institutions support update and modify spaces in a rapidly changing environment and one in which funding is difficult, and ensure best use of these spaces?
- What expertise and models do we have to share and need to develop in responding to these changes?

This section summarises the thoughts, feedback and reflections on these questions.

6.1 What will learning be like in 2015?

Building on the presentations, workshop participants were asked to consider the question 'What will learning be like in 2015?'

The responses strongly support what research and practice already indicate: learning is likely to change dramatically in terms of technology usage, learning and teaching spaces and learning and teaching styles as well as in terms of the student body. There will be significant associated changes in the social aspects of learning.

There was clear agreement that learning is becoming more and more reliant on technology and that this technology will continue to become more invisible, wireless and highly integrated respectively. This will also have an impact on the types of resources to be used, e.g. it is likely that there will be more online textbooks and fewer paper-based resources.

Yet simultaneously, people recognise that a stronger reliance on technology is going to have an impact on social equity and access to tertiary education.

There was also a consistent belief that online and distance learning will play an increasingly important role in the years to come. Student learning is becoming more globalised and interconnected, accompanied by changes in culture and context of learning. Participants noted that they expect student learning to be more fluid, holistic/generalised and at the same time more specialised; learning will possibly be more research, analysis and synthesis focused and moving from different activities will happen seamlessly. Consequently, capabilities such as creativity, innovation and adaptability will be of higher significance. Workshop attendees hope that this will be a 'communal' experience rather than an individualised one.

On the downside, this could also result in learning becoming more fractured and diverse – more 'pick-and-choose' as one workshop attendee expresses it.

In terms of learning spaces, learning will more and more mimic the professional workspace, utilising real and/or virtual classrooms/worlds, becoming more vocational, employer-focused and rather training-oriented.

Flexibility in the learning experience will be essential, regarding time, place, delivery, and areas of study as well as more accessible modes of delivery. One can expect access to relevant spaces and places to be available 24/7. There will be less distinction between learning and social space.

A number of participants' responses reflected upon the nature and style of learning in the years to come as well as in what direction student learning should develop. There is strong agreement that learning needs to be more collaborative locally and globally, social, facilitated in small groups and focused more on problem based learning rather than lecture based learning. Technology is viewed as a means of facilitating collaborative learning. At the same time, increased technology use could also lead to learning styles being more fragmented, especially if students rely on the internet as the primary source for gaining knowledge. Concern was expressed that students may be more 'superficial' learners with a short span of activity/attention.

And what of the students themselves? As already observed, today's students come from a large variety of different learning experiences, which is likely to increase in the future. The number of international students

is also likely to increase further; posing questions about gaps in learning experiences, access to distance learning, etc.

Participants also reaffirmed, current research findings, highlighting the value of self-directed, lifelong learning that is more personal and individual, highly interactive, engaging and experiential. This in turn has an effect on the nature of teaching which is seen to become less prescriptive and formal and come from a wide range of sources.

6.2 What will students be like in 2015?

Drawing a picture of the future university student may also assist in creating an environment for students (physical or virtual) which supports and enhances the quality of learning.

There is a general consensus that the future student is rather to be seen as a consumer with high expectations in terms of both facilities as well as the quality of teaching. This might be even more so for postgraduate than undergraduate students. Since most students are paying for their degrees, they are likely to be more selective consumers of services available, seeking value for money, more strategic in the use of their time, and are more focused on the outcomes they are paying for. This theme was picked up by Les Watson and also Mr Derek Powell (UQ) who stressed that good learning space is also a good marketing device.

Regarding emerging technologies, students are expected to be more ICT and multimedia literate, technologically advanced and reliant, and networked with friends; their IT skills are likely to be better than those of academics and they are probably more facile technologically than current students while using the net to create, learn and exchange more readily than now. Future students' ability to multitask may be more developed than today.

It is expected that more and more students will pursue their second degree by technology or via remote learning.

According to workshop participants, the forthcoming generations of university students will be time poor with increased demands on their time and more critical of what is taking their time, thus, spending less time on campus than former generations of students. In this regard, it was also mentioned that future students will not separate learning as much from other pursuits of living each day (ie less timetable focus).

At the same time they are expected to be more mobile, adaptive, flexible and independent, seeking personal relevance in their studies and are more market driven.

They are likely to come from a broad range of demographic and academic backgrounds and will require a diversity of environments to learn.

6.3 How can we enable more creativity in our students and staff?

Creativity is seen as an essential quality to successful performance in future society as highlighted by two of the keynote speakers: Les Watson and Nick Klomp. Thus, participants were asked how to enable more creativity in university students and staff.

Three themes emerged from these responses with the first being the relation between creativity and physical space. Workshop participants suggested that teaching and learning spaces will need to be remodelled for more flexibility and new modes of learning. For example universities will need to provide open plan classrooms, offices and laboratory environments wherever possible and a diversity of spaces.

It was stressed that student and staff input into planning and the provision of feedback on classroom spaces and future needs, is an important aspect of creating spaces that facilitate learning. Providing grants for developing learning space grants could be a valuable means of achieving this. In order to create an awareness of the significance of learning space, principles of learning space design, the features, benefits and opportunities, should be clearly articulated.

In developing and improving spaces enabling creativity, there is a need to take risks, to 'challenge' space – this will require a readiness to allow mistakes to happen on the journey.

A second theme evolved around the significance of good teaching in order to foster creativity. This included the following:

- Empowering and mentoring students and teachers
- Giving students more time to explore, teaching them how to use the time for reflection and acknowledging and rewarding creative thinking
- Providing authentic learning opportunities, i.e. facilitating real world issues to solve
- Placing an emphasis on generic learning, rather than early differentiation
- Allowing risk taking and mistakes
- Utilising alternative assessment methods
- Engaging in dialogue about creativity
- Promoting and encouraging engagement (students & teachers)
- Changing the academic mindset on delivering lectures to using teaching times to greater benefit
- Being prepared to discover things and adapt
- Practising team teaching, peer review and feedback
- Ongoing training

Thirdly, promoting and generating creativity also evolves around general support and university structures. The university context will need to change as a whole, supporting appropriate infrastructures, allocating resources to creativity and, most importantly, providing better leadership support. There is a need to retrain staff and develop new curricula, to encourage cross-disciplinarity and to facilitate seminars and workshops on emerging matters such as creativity. Further suggestions include changing promotion criteria to value creativity and reducing bureaucracy.

6.4 How can we use buildings/space to change/enhance the education experience of students?

The presentations have shown that space greatly impacts on the way people learn and teach. How could space then be created and used to change our education system?

Participants acknowledge that space can expose students to new experiences as well as open unexpected opportunities; at the same time, space can also 'close-down' possibilities, depending upon design. For example, if a space is designed for a particular activity and is not flexible or if the building 'suggests' a

particular type of activity. Space also creates conditions which have an impact on teacher behaviour, thus influencing actual teaching practice (and therefore impacts pedagogy).

The first step of any such change initiative should always include clarity re exactly what it is we want to change and what outcomes will be served. It can also be fruitful to reflect on whether a new building/space is needed or whether existing space can be re-arranged.

Any initiative/design should be based on evidence and evaluation, and needs to be developed within the context of: the institution (goals and mission); the discipline; the student body; and the curriculum. Moreover, connections must be made between the student experience (academic, social, technological), the curriculum, the administration of 'being a student', and the space.

Social aspects of spaces (both formal and informal) are seen as particularly important and there is a need to recognise that *people* are the most important aspect: *'First we shape our buildings, then they shape us'* (Churchill). It is crucial that we align the real needs of learners with our intentions.

With regard to virtual spaces, a number of participants recognise the challenge of creating social space in the virtual environment: what should be used (Facebook, MySpace, etc.) and how can we encourage students to engage and participate online?

Further comments/suggestions included:

- The importance of management and maintenance of spaces: there is a need for strategies for ensuring new spaces continue to be effective, as a 'degraded' space is a powerful disincentive to student engagement
- There needs to be a balance between the virtual and physical spaces, and between public (open) and more private spaces
- The importance of determining ownership of the building: who has the power in relation to its design and use? Policy of building design/legislation determines to a large extent what we can do and institutional imperatives and resources, shape what becomes possible.
- Minimising the security aspects to make access easy
- Rearranging people and furniture not space

No matter what changes will be implemented – this should always depend on the context of a particular institution, not just on the latest fad – we must recognise that we cannot predict the future and things can go wrong; therefore we need to seek openness, flexibility and variability.

6.5 How can institutions ensure that the spaces developed today promote best practice in learning and teaching?

In developing innovative places and spaces, institutions should constantly reflect on and reassess their planning on the basis of whether this actually supports quality learning and teaching. Workshop participants provided a wide range of suggestions and ideas:

In terms of design, a good quality consultation and briefing process is essential. Aim to be at the 'cutting edge', but also identify fads. Other design considerations should include:

- Attention to physical cues and psychological cues

- Inbuilt flexibility and adaptability
- The floor plan should be designed so that services/service core do not dictate use of spaces or inhibit flexibility
- Consideration should be given to atmospherics (sound, smell, acoustics)
- Importance of longevity of materials and furniture
- The sense of place: character, comfort, atmosphere and impact
- Furniture should be adaptable and flexible
- Avoid technology-led building design that fails to consider student numbers and the effect on teachers and teaching
- Spaces should be designed for deconstruction
- Adequate room for expansion of infrastructure such as ICT and power

Developing new spaces should always involve all stakeholders in the decision making process.

In order to make the best possible use of spaces, staff development is essential as is appropriate support for the learning space generally. People must be equipped with the skills to keep the space relevant.

In order to ensure sustainability, technology and the stakeholders' needs must be continually assessed. Budgets for ongoing maintenance are crucial, as is ensuring part of the budget for virtual spaces is allocated to website updates.

6.6 How can institutions ensure the spaces developed today will still be useful later in their life cycle?

Flexibility is key to ensuring relevance over the long term. Initial planning and design needs to maximise flexibility to allow for change or redesign. This could include a building structure that is adaptable with internal walls, non load bearing where possible and services (power, data, air, water) that are less reliant on internal walls. Spaces should be multi-purposed and built in a flexible, adaptable way. Technology should be portable rather than fixed.

Initial planning is critical and needs to recognise that spaces under development *have* a life cycle; thus, the potential use(s) of a space during its life cycle must be identified and articulated. This includes understanding what is to be achieved and what impact this will have on current teaching and learning priorities. A useful strategy is to engage practitioners and stakeholders, who will be users of the building/space, both building engagement and anticipation of the space and incorporating their perspectives.

An evaluation of the initial development is valuable so that redesign can be implemented as required and an ongoing maintenance plan can be identified and actioned over the spaces life cycle. In this regard, participants suggest modelling or piloting on a smaller scale prior to investigating/embarking on a major redevelopment.

6.7 How do institutions support update and modify spaces in a rapidly changing environment and one in which funding is difficult, and ensure best use of these spaces?

Continuous change and cuts in funding can make it difficult to develop innovative new spaces which help to promote quality learning and teaching. This is why flexible solutions are needed.

Participants agreed that one must be prepared to compromise including some flexibility over budget, space and time and that more lateral thinking is needed. For instance, there might be opportunities to 'renew' previously unused/underutilised space (e.g. corridors) and convert into more functional and purposeful space. Funding pathways need to be established that allow modifications of spaces. Another consideration is to focus more on interaction and allow that to occur with minimalist spaces.

Flexibility is also needed in the kind of furniture chosen: it should be adaptable and be easily moved into other configurations; change should cause minimal disruption and cost.

A good consultation process and an effective life cycle assessment that incorporates good facilities management and design strategies, is fundamental. The planning focus should be on the critical aspects of practices and behaviour, and how these may be facilitated as simply and effectively as possible with the recognition that nothing is ever permanent.

6.8 What expertise and models do we have to share and need to develop in responding to these changes?

Participants' responses indicate that there needs to be a more holistic and systemic understanding of how we tackle these issues. During the planning stage, questions such as: *What do we do now? Where do we want to go? What it is like for the students now and what would they like? What do we want to achieve?* should guide design developments.

This systemic view necessitates the facilitation of productive conversation, consultation and collaboration between all stakeholders involved, particularly relevant academic staff and students – perhaps through effective, inspired and consultative leadership. There is a need to work in teams and do internal work (where possible) before engaging architects and designers. The expertise and first-hand experience of everyone involved inside the institution are valuable assets.

In terms of design, process and principles should be considered with pedagogical underpinnings; pedagogy needs to be interpreted into realistic practice and vice versa. All stakeholders need a clear and shared design vision linked to pedagogy.

There needs to be a better understanding of design as a facilitator of human practices that can shift and shape behaviour; good design is user focused! Universities should work towards a synergy of spectrum of learning spaces from faculty to general learning spaces including library learning hubs.

Strategies for successful implementation of design, which supports and enhances quality learning and teaching were:

1. Ensure mechanisms for dissemination of best practice
2. Professional development in regard to the influence of the teaching space
3. Evaluation: development of conceptual frameworks for the evaluation of design projects in the context of teaching and learning and the student experience.
4. Reflection and redesign where appropriate