

The Advanced Concept Teaching Space





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THE ADVANCED CONCEPT TEACHING SPACE (ACTS)

GENERAL PURPOSE NORTH 4 BUILDING
ST LUCIA CAMPUS

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2008

Produced by

The Next Generation Learning Spaces Project

Introduction

Professor Paul Greenfield AO, Vice-Chancellor

The University of Queensland is one of Australia's leading broad-based, research-intensive universities and is committed to the excellence of learning experiences and outcomes for its students.

A key objective of the University is to provide a high-quality learning environment that encourages independent learning and peer-to-peer interaction. To meet this objective, the University, in recent years, has invested in new teaching and learning spaces that are recognised as international benchmarks for excellence and innovation. Furthermore, it has supported the provision of advanced teaching spaces intended for multiple uses that incorporate formal and informal requirements.

The University's Advanced Concept Teaching Space (ACTS) Lecture Theatre in the \$52 million General Purpose North 4 building on the St Lucia campus opened in 2008. ACTS has attracted worldwide interest with groups from Europe, the United States, the Middle East, and Asia visiting to study its unique learning concepts.

This publication, which is part of a suite of resources developed to assist understanding of advanced teaching spaces at The University of Queensland, has been produced by the Next Generation Learning Spaces (NGLS) Project. This initiative, jointly funded by The University of Queensland and the Australian Learning and Teaching Council, is focussed on the research, development and evaluation of new learning spaces within higher education institutions, and has received positive national and international interest.

The Next Generation Learning Spaces Project and its findings are crucial elements in facilitating The University of Queensland's provision of excellence in learning experiences and outcomes for students.





Background

The Advanced Concept Teaching Space (ACTS) was conceived as a concept and technology demonstration space that would establish The University of Queensland at the forefront of research into Teaching and Learning infrastructure.

With 100 seats, ACTS has the look and feel of a modern lecture theatre but it also hosts futuristic IT and AV systems designed to maximise communication and interaction allowing new concepts in pedagogy and technology to be implemented, tested and evaluated with large student groups. This new facility boasts teaching technology not expected to be commonplace elsewhere for at least a decade.

ACTS, which has been funded from the Australian Commonwealth Government's Learning and Performance Fund, has a major role to play in meeting the goals of The University of Queensland's Teaching and Learning Enhancement plan.

The concept of ACTS was devised by UQ manager of Teaching Technology Support, Derek Powell, and developed following a series of interviews with leading UQ academics before being presented to Professor Michael Keniger, Deputy Vice-Chancellor (Academic). The approval for the project followed the success of the University's ground-breaking Collaborative Teaching and Learning Centre (CTLIC) which opened in the Sir James Foots Building in 2005, although ACTS has quite different goals.

Where the CTLIC gives students and academics innovative space and flexible technology to pursue collaboration in teaching and learning, ACTS is squarely aimed at advancing the pedagogy of one-to-many teaching; lectures and seminars.

A key objective of this plan is to:

Enrich all aspects of the teaching and learning environment [and] continue to place a high priority on teaching space upgrades and the development of state-of-the-art teaching and learning spaces.

While ACTS is in itself a state of the art teaching and learning space, the lessons learned from its ongoing operation and evaluation will inform and direct the University's own practice when building and refurbishing teaching and learning space. It is also expected that ACTS will play a key role in enabling research into new pedagogies, new teaching technologies and teaching space design.





ACTS uses new technology to maximise the opportunities for interaction between teacher and students; amongst students and between students and the learning materials. A primary goal is to find ways to open new communication channels during teaching sessions. Crucially, this includes being open to integrating 'student-supplied' technology. Increasingly, students are using a variety of technology in their lifestyles and learning, and ACTS explores ways to integrate this using wired and wireless networking and direct USB connection.

The goals of ACTS are:

- Identify the best emerging technology and test it in real teaching situations
- Use the lessons learned to improve future lecture theatre design and optimise the use of technology in these spaces
- Create opportunities for research into tertiary teaching
- Use the lessons learned to inform and direct the University's own teaching practices
- Provide the possibility of developing intellectual property in the systems and technology implemented in ACTS

ACTS will be a laboratory for teaching technology and is capable of rigorously evaluating each new practice. It will allow the best emerging technology to be tested and adopted into mainstream UQ teaching spaces.



Pedagogy

While the University has rightly attracted plaudits for its pioneering work in creating spaces tailored for teaching using collaborative modes, it has been recognised that teacher-led instruction (such as the lecture format) remains a crucial and much-used pedagogy.

ACTS proposes to explore what can be done using technology to develop teacher-led instructional approaches within a university setting.

At the beginning of the design process, the chairs of the UQ Faculty Teaching and Learning Committees were surveyed to determine the kinds of facilities and technologies that academics were most interested in for teaching. The process involved gauging the utility of current technology as well as soliciting reactions to a list of evident future trends in teaching technology.

The academics were also asked about the amount of time which they consider reasonable for the preparation of teaching aids and materials (such as PowerPoint slides, polls and other in-class material) and the utility of real-time feedback from students in class. At each stage, additional comments were sought and open-ended questions probed for new ideas.

The pedagogical ideas and reactions to trends which emerged were used to inform the design and provide an initial roster of technology features. The suggestions were evaluated in terms of improving or opening new channels of communication and these were organised using constructivist principles. Three kinds of interaction are important in this regard: between students and other students; between student and teacher; and between students and the learning materials.

As a result, the features and technologies in ACTS aim to open new channels of communication and to permit new kinds of interactions to occur during class sessions. Some aim at making it practical for teachers to gain extra feedback from students, some allow for student to student interaction during class and some new ideas are aimed at providing new ways for students to interact with the learning materials.





Teacher-Student Interaction

Clearly, there is still a role in teacher to student interactions for the use of a projection screen and consideration was made in the space design for this to be a prime element but attention was also given to ways of enabling a 'back channel' from students to teacher. Activities in this axis included instant polling which enables students to vote on questions, encouraging involvement and also providing teachers with immediate feedback on student understanding of key concepts. Other techniques identified as worthy of trial included anonymous interaction in the form of submitting questions via instant messaging which may allow teachers to better manage queries without interrupting the delivery of material.

Student Interaction with Learning Materials

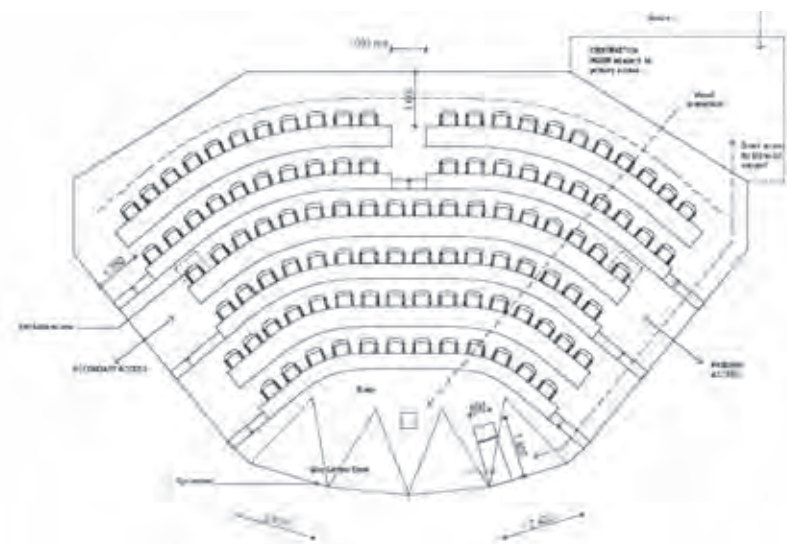
Consideration of this axis led to a number of possibilities for improvement. Students should ideally be able to record and annotate the materials being presented and perhaps be able to access different 'layers' of content which has been prepared in advance. It seemed likely that if students were given individual displays, then facilities like translation and access for visually and hearing impaired students may also become more accessible and effective.

Student-Student Interaction

Academics consistently identified a need to allow students to break into small groups for short periods to discuss matters raised in the presentation and to become active in their participation. With this in mind, attention turned to how the traditional (and space effective) tiered seating could be adapted to allow ad-hoc small groups to form.



Space



ACTS is situated on Level 1 of the General Purpose North 4 (GPN4) building designed by Richard Kirk Architect and ML Design (in association). The space contains several novel elements in its specification.

Before construction, and after extensive consideration of the kind of activities required, the general arrangement of the space was documented by Hamilton Wilson (Wilson Architects). This generic plan became the basis for the detailed design work carried out by Richard Kirk Architect.

Brendan Pointon comments:

In planning the spatial aspects we first considered the pedagogy, which was determined to be primarily a lecture profile, with the didactic mode taking up 80% of the time. The cohort in this mode was to be 100 students. The remaining 20% of time was considered to be available for small group discussion with a cohort of four.

In response, the design specified a tiered theatre but with a double row of desks per tier and swivel chairs on castors. This would allow collaboration between groups of four with two in each row of the double tier. To accommodate this, the rear desk was made wider and the desktop tablet displays were mounted on swivels. In addition, care was taken to provide an adequate circulation zone.

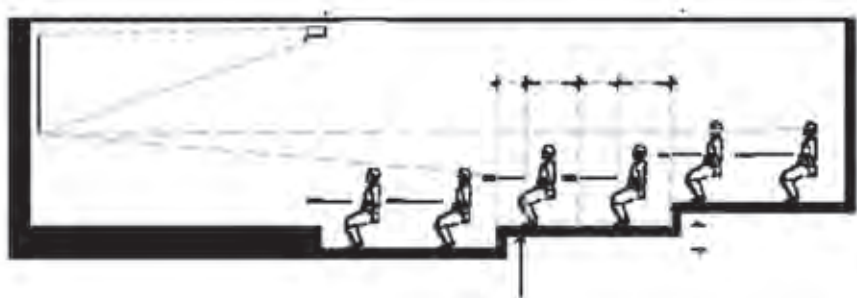
The Teaching Stage

The teaching stage was laid out to be as flexible as possible with two 'lecterns' (one either side) and three screens for displaying content to the class. Two of the screens retract to reveal plasma displays which function as electronic whiteboards.

Care was taken to provide monitors at the front of the stage so that the instructor could view material on all three screens without needing to turn their back on the audience.

Observation rooms

Since research into teaching methods and technology was a prime function of the space, a spacious observation room was provided at the rear of the room. Wide windows and access to video cameras allow researchers to carefully monitor how students use the various technologies provided. In addition, the observation room has a duplicate computer and control system to allow an operator to assist in complex presentations.



Technology

Although the 1500m² ACTS has the look and feel of a traditional lecture theatre, it hosts futuristic systems designed to maximise communication. This includes a number of specific directions for researching new ideas and infrastructure in the lecture setting.

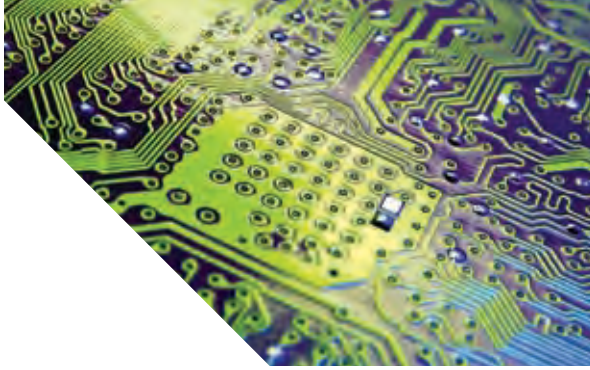
Audio-Visual in ACTS

Advanced Control Systems

The emphasis of the automated control system is its ease of use and a design philosophy that places the needs of the teachers first. A primary goal is to have all of the hardware and software systems controlled from a single AMX touch screen interface. Touch screen buttons will not only control hardware like switchers but will also 'reach through' the computer operating system to launch specific features within a software program on the attached PCs. A single button press will be enough to launch an instant poll on the student touch screens, or to launch translation software that will render a PowerPoint file in six different languages. When the PC is displayed on screen, the touch screen can function like a mouse so that individual browser links, when displayed on the monitor, can be launched by pressing with a finger.

In a first for this kind of technology, AMX Anterus RFID identification tags are used to set preferences in the control system so lecture setup can be automated. Instead of a log-in password, academics may carry an RFID badge so that as soon as they enter the space, the control system will recognise them. The AMX controller will be programmed to 'learn' the individual preferences of each identified user and quickly set up the room to reflect their needs.





Information Technology in ACTS

A major technology innovation has been to place a tablet style PC interface at each seat. This has been achieved using a pen driven tablet which communicates via a networked thin client to a rack mounted array of over one hundred HP blade PCs. The PC technology in ACTS is based on Hewlett Packard's Consolidated Client Infrastructure, a technology that combines server style reliability with high level desktop performance through the use of HP Remote Graphics software. As there are no moving parts in the Thin Client devices, this also creates a silent environment for teaching.

The detailed IT design brief was implemented by Luke Angel, Principal IT Officer of UQ Campus Technology Support, with the assistance of Hewlett Packard's Remote Client Solutions team. Like AMX, HP has been a partner in the project since 2006 providing both consultation and input at the overall strategic level and in-depth technical assistance.

The student interface which combines a HP Thin Client with a Wacom 15" tablet gives the user uniquely flexible control over the educational software environment. The student touch screen functions both as a display and as a control/response system allowing a host of innovative services, which can be tailored to each teaching requirement:

- Look ahead and review
- Polling and voting responder
- Enable anonymous questions
- Download to disc
- eLearning system integration
- Automated language translation of PowerPoint slides
- Information capture for research

ACTS systems allow students to self-guide through lecture material and to review and preview content, or branch off into specially prepared supplementary material. Students are provided with language support in the ACTS through an automated translation system that allows students to instantly search for unfamiliar terms.





Integration of Portable Devices

A primary goal of the experimental systems in ACTS is to allow students to use whatever technology they prefer in their learning – from iPods to PDAs, mobile phones to laptops. An important part of the project will be to research and test a variety of ways in which students can use these portable devices to participate in class activities.

- Assignment work, brought to class can be uploaded so it may be displayed via the projectors for class comment and discussion
- Portable devices, connected via the network or USB can be used by the students to participate in polling, or to share applications
- Using various software options, recordings of lectures may be made available to students, complete with graphics. By capturing content from electronic whiteboards and graphics tablets 'worked examples' (including handwritten formulae) can be recorded as they happen to allow student review at a later date
- Other content such as readings, references and more can also be downloaded, saving time and resources and enriching the learning experience

Innovative Lighting Design

Lighting is used not only to direct attention and enable note taking, but as a deliberate artistic design element to inspire and motivate. The award winning lighting design by Jared Lilywhite of Connell Wagner is flexible enough to cater for a wide range of applications in the space from lectures to conference sessions to d-Cinema film exhibition and beyond. Accent lighting highlights architectural features to produce a series of very distinctive looks which can be varied according to the time of day and the nature of the functions in the space at that time.

Enabling Research

Integral to the space is an observation room which also functions as a third control point. An identical 24" touch screen allows a technical aide to assist with smooth operation of the systems and provides full preview and monitoring from the same screen. Additional thin client facilities are networked into the student PC systems for researchers to observe and gather data regarding patterns of interaction and educational outcomes.

Keeping the Space Current

An issue with any new space, especially one that contains leading edge technology, is that it can date very quickly. Thus the design and installation of ACTS anticipated the likelihood of advances in technology over the lifetime of the space. The innovative Hewlett Packard blade PC system allows the student computers to be replaced and updated as technology advances by simply sliding out a PC card and replacing it with a new model. AMX technology, which allows program changes to enable users to take complete control of any new hardware or software, will be similarly crucial in this respect.

Importantly, teachers will not have to embark on a massive learning curve to use the new facility. Using the simplified AMX interface, teachers can choose which technologies to trial and do not have to come to terms with all of the new ideas at once.



The future

The University of Queensland is committed to undertake systematic evaluation and review of the evolution and operation of the Advanced Concept Teaching Space.

To this end the University is putting in place a comprehensive management strategy to promote, embed, manage and evaluate advanced teaching spaces.

A cross disciplinary group chaired by a member of the Teaching and Educational Development Institute (TEDI) oversees the management of ACTS. Members of the committee include the teaching spaces manager, the manager of Teaching Technology Support and representatives drawn from the ranks of academics across all three campuses. The goal of this committee is to promote the use of the space and to develop and maintain

the facilities. To this end, small grants are made available to academics on a competitive basis which provide funds for the development of curriculum or teaching aids particularly suited for use in these collaborative environments.

Lessons learned from the different kinds of collaborative space in the Collaborative Teaching and Learning Centres (CTLIC) at the St Lucia and Gatton campuses were incorporated into the design for ACTS. The intention for ACTS is that features which prove successful will be incorporated into future mainstream teaching spaces across the University.





Innovative teaching & learning spaces

The University of Queensland has in recent years attracted significant attention from both within Australia and internationally on the quality of the teaching spaces being provided for staff and students.

Not only has it made major investments in dedicated spaces for novel pedagogies, but has also pursued an aggressive policy of updating and adding new facilities to existing teaching spaces of all kinds. Another focus, spinning off from the work on collaborative teaching and learning has been the growth of student learning centres – dedicated spaces for students outside of timetabled classes. ACTS is considered to be a capstone project to establish The University of Queensland at the forefront of research into Teaching and Learning infrastructure.

New Pedagogies: Collaborative Learning

The Collaborative Teaching and Learning Centre (opened in 2005 in the Sir James Foots Building, St Lucia) is a world first in the provision of dedicated space for teaching in collaborative mode. The six CTLC spaces, ranging from 20 to 90 seats, foster collaborative approaches to teaching and learning, both internally in the small and large collaborative teaching and learning spaces and externally through the videoconferencing and access grid rooms.

These purpose designed and built spaces offer the ability to teach using collaborative pedagogies that are impractical in 'traditional' teaching and learning spaces. The novel architecture and exciting technology of this unique centre sparked national and international interest and the centre has been visited by literally hundreds of academics and administrators from more than sixty Universities. The initial spaces have been rigorously studied and evaluated and The University of Queensland has continued the development of innovative collaborative teaching spaces into further generations with the opening of spaces at the Gatton campus and in the General Purpose North 4 building at the St Lucia campus.



Student learning spaces

Lessons learnt from the evaluation of the CTLC have also informed the design of a number of other original, student focused learning environments.

These spaces, used for independent and group oriented study and assignment work, have been developed within Faculties and Schools to serve particular cohorts and also incorporated into libraries such as the newly refurbished Biological Sciences Library.

The first student learning centres were dedicated to first year Engineering and Science students respectively with centres for Chemical Engineering and Journalism under construction and more planned.

Continuing Refurbishment of Teaching Space

The more than 160 centrally timetabled lecture theatres and seminar rooms are carefully maintained and refurbished

when needed, usually on a 12 year cycle. Major spaces which have been completely refurbished in the past four years include raked theatres in the Social Sciences, Anatomy and Engineering buildings as well as the classic 360 seat Abel Smith Theatre. Special care is taken to sensitively treat teaching spaces in the heritage listed buildings of the Great Court precinct and these spacious, high ceilinged rooms have become showcases of modern teaching technology and space design. Standards for AV and IT fit-out of teaching spaces are reviewed every three years and current standards provide for wireless internet access, lectern PCs, data projectors and integrated control systems in all centrally timetabled rooms. Between refurbishments, a rolling four year program of regular replacement of key technology such as PCs and data projectors keeps the rooms up-to-date.



Practical Teaching Spaces

Specialist teaching spaces, such as laboratories, are the responsibility of the faculties. The first-year Chemistry laboratories and the newly built Counselling Practice rooms in the Chamberlain building are outstanding examples of purpose built practical spaces. Gatton campus is about to undergo a massive expansion with new Veterinary anatomy laboratories and the innovative Gatton e-Learning Laboratory already in design stage.

New Facilities in Teaching Spaces

Major new capabilities added to several existing central teaching spaces include intercampus Videoconference teaching spaces (between Gatton and St Lucia) and a comprehensive and integrated lecture recording system. Phase I of the lecture recording system, installed in 2007, serves the 13 largest theatres with a combined capacity of around 4,000 students. Both screen content and voice can be recorded and automatically made available to enrolled students in a variety of formats for replay on PC, iPod and so on. Following careful evaluation and an on-line survey of over 1000 students, an additional 25 lecture spaces will be progressively equipped in 2008/9.



Library Spaces

The award-winning UQ Library is the largest research library in Queensland and an integral part of university life. The Biological Sciences Library has recently undergone a \$13.5m refurbishment by Wilson Architects and includes an additional 800 m² of space to accommodate the growing collection and new postgraduate study spaces. These spaces include discussion rooms complete with data-projectors and plasma screens, three training rooms, more than 200 computers, a graduate study centre, AV booths, as well as a mix of individual and group study spaces. All of these additions cater for diverse learning experiences where printed and digital information is combined in an entirely user-focused environment.

The Ipswich Library is situated in an innovative multipurpose learning facility which also houses the Student Centre, Student Support Services, Student Union, Health Services, and the Office of the Pro-Vice-Chancellor. The setting includes a garden, spaces for flexible learning styles and access to information technologies. This is the first building at the Ipswich campus to be specifically designed to encourage both social and academic interaction. The redesign of the Ipswich Library was undertaken by Wilson Architects. As a result of the design intent, the Ipswich Library provides an appealing environment for informal learning activities and access to a range of services.





Suggested reading

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Produced by
The Next Generation Learning Spaces Project in association
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