

# 5.2

## Collaborative Teaching & Learning Centres at the University of Queensland

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### What is it?

The University of Queensland now has three Collaborative Teaching and Learning Centres which represent an evolution in understanding of the interrelation between pedagogy, space and technology. The original and largest centre, with six collaborative classrooms of three different types was opened in 2005 and is located in the Sir James Foots building on the St Lucia Campus. In 2007, a second generation space was opened at the Gatton Campus, sixty kilometres west of Brisbane, consisting of two combinable spaces accommodating 36 students each with a total of eight new-style pods (group working spaces). A further iteration of the design, in the form of a single, six-pod classroom for 60 students, has been incorporated into the new General Purpose

North 4 building at St Lucia, opened during 2008.

Each of these projects has been part of larger developments, so the specific costs just of the collaborative spaces are hard to pin down. The first and largest project was part of a \$24M new building project. Approximately \$1.5M was spent on the Audio Visual, IT and furniture fit-out of the six spaces which together hold around 300 students. The fit-out of the newest space, part of a \$54M six-storey building and designed with a significantly more 'corporate' feel, is estimated at around \$0.5M. The Gatton Regional Collaborative Learning Centre involved the complete renovation of old laboratory space into the twin collaborative spaces, plus a videoconference-equipped teaching room and a standard seminar space. This entire project was budgeted at around \$1.8M.

The original Collaborative Teaching and Learning Centre (CTLC) incorporates three distinct kinds of spaces each of which operate in three different teaching and learning modes under the command of the integrated control system. The 90 seat large collaborative teaching space can be thought of as a single, wide aspect, seminar space which physically divides into five separate group working spaces (called pods), each of which has its own IT facilities and a full audio visual sub-system with independent control of sound, projection and lights. The unique, lobed design of the interior, together with motorised screens and blinds create distinct group work 'rooms' within the space and the transformation between teacher-led (seminar) and group (pod) modes is overt and physical.

The two small collaborative spaces (30 and 40 seat) divide into three group work spaces, however the pods are not physically divided by screens so the transformation is virtual, signalled by lighting changes and display switching.

Two twenty-seat externally focused collaboration spaces adjoin the small collaborative spaces and here the focus is on enabling group collaboration at a distance through videoconference and Access Grid facilities.

The second-generation collaborative teaching



space at Gatton builds on the lessons learned from the evaluation of the St Lucia Centre. The room foregoes the room-within-a-room transformation typical of the large spaces at St Lucia in favour of concentrating the group activity around individual 10 seat pod tables. These pods, however still overtly signal the shift in pedagogical mode using large screen monitors which rise from the end of the table to enable on-screen group collaboration.

In the third generation space, the three modes of student free use, seminar and pod remain unchanged. However a semicircular hub-and-spoke arrangement of the pods within the space gives a superior focus on the teacher-led pedagogies on one hand, while freeing extra space for group activity in the pod mode.

### Why it is?

The full chronology of the development of UQ's first CTLC has been captured by Peter Jamieson in an (as yet) unpublished paper (Jamieson, 2005). His insights into the inter-relationship between the teachers, architects and technologists were extraordinarily prescient and became an important contributor to the development of the Next Generation Learning Spaces Pedagogy-Space-Technology rubric. The subsequent, sometimes rocky story of the development of the second and third generation spaces demonstrates not only the importance of understanding these relationships, but also the difficulties of applying the key principles of harmonising Pedagogy, Space and Technology in the real world of conflicting politics, egos and budgets.

The inspiration for these new pedagogies at UQ came from Professor Margaret Gardner, then Deputy Vice Chancellor (Academic). Her previous experiments in new teaching methodologies had convinced her that new kinds of spaces were needed to move these pedagogies forward. New projects serve at least two important

functions in this context. Not only do innovative teaching spaces directly and physically enable the desired practices, the rooms also serve as an unmistakable signal to the academic community that changes to teaching and learning practice will be encouraged and enabled by the University. Crucial as Professor Gardner's input was, the spectacular and multiplicative strides that UQ has achieved in the last half decade would not have occurred without more of the "happy coincidences" which Jamieson (2005) highlights. Professor Gardner's successor, Professor Michael Keniger is an architect and his professional understanding of the potential led him to immediately take up the baton, championing the continued innovative development of space and the integration of ground-breaking teaching technology. Proving that good fortune can come in threes, Professor Deborah Terry, as DVC Teaching and Learning has brought a psychologist's and a teacher's understanding to the leadership role, helping focus attention on the need to evaluate, consolidate and inspire academics to achieve within the spaces.

From its inception, it is true to say that the CTLC project was driven by pedagogy and the need to more effectively support changing teaching and learning practices. UQ's Teaching and Educational Development Institute (TEDI), the body responsible for professional development of teaching in the University, has played a key role. At the design stage, successive directors of TEDI have worked to define the pedagogy which the spaces were to foster and provided input to brief the architects. Post completion, their focus has shifted to providing specific training to academics, fostering the take up of collaborative teaching through innovative grant programs linked to appropriate use of the spaces and undertaking evaluations. A significant contribution should be acknowledged from individual academics, especially those who have allowed case studies of their methodologies to be collected and distributed. Ultimately, the value of the project will be determined by the effectiveness of the teaching.

In respect of space, two kinds of contribution

should be acknowledged. The first is budgetary and both experience with UQ's own CTLC and examination of other learning spaces has shown that collaborative modes are significantly more demanding in terms of square metres/student than more traditional lecture theatres, seminar rooms or library quiet study spaces. In this project, both university executives (as capital managers) and facilities management (as space stewards) recognised the value of these kinds of spaces and were prepared to make the larger investments required to facilitate their creation and maintenance. The second contribution of course was in the design and construction phase in which the contribution of the project architects (Wilson Architects) has been paramount.

Technology has also been a significant factor, and was identified during the design phase as being crucial to the success of the project. However, the use of the technology in innovative ways by the academics post occupation has been just as important.

It should come as no surprise that the crucial decisions fall quite distinctly into the three key categorisations that are the basis of this paper,

given that the project itself contributed to the categorisation. First, the decision to encourage the uptake of alternative pedagogies by the creation of purpose-designed space cannot be seen as anything other than key. The credit for the original decision belongs with Professor Gardner, but the existence of the second and third generations is due to the considered deliberation of Professor Keniger, supported by other leading academics in both the front line of teaching and in TEDI.

In respect of space, architect Hamilton Wilson chose first to embark on the arduous and potentially risky course of an extended set of consultations with academics during the extended pre-design (brief) and design stages. His willingness to not only create designs that were responsive to a need to enable specific behaviours but to then test those against research and experience gained from related learning environments (such as libraries) were fundamental to the final outcome. Within the space plan, different kinds of space were created to specifically cater for the needs of different students, identified through behavioural studies. The link between

a new definition of the behaviours required (of students and academics) and the novel space designs can be clearly seen in the large and small collaborative spaces at St Lucia.

The operation of the CTLC is difficult to imagine now without the technology that empowers and encourages the mode changes in the teaching and learning, yet this novel design response came about largely by accident. A key element of the traditional technology specification process - the user requirements document - was missing, derailed by the novelty of the space design which simply didn't fit with existing Audio Visual practice. As a result, the technology brief was not completed until very late in the design process, when many of the space provisions had already been fleshed out in considerable detail. Co-author Derek Powell, as a newcomer to technology for tertiary education (and ignorant of the 'proper' process) chose to separately research the requirements of the pedagogy, then responded to the novel space design with a theatrical solution born of experience in the entertainment and broadcast television industries.



### What pedagogical principle(s) drove the design?

Throughout the original process, and to this day, the literature on collaborative teaching (as opposed to collaborative learning) is somewhat sparse. The design processes revolved around an imagined set of behaviours along with examples from the few projects existing in the area, such as Stanford's Wallenberg Hall (see <http://wallenberg.stanford.edu/>). Care was taken not to rigorously define what was expected, so as not to stifle creativity and innovation, however three phases in a typical collaborative session were identified. Initial input from the academic to the whole group was envisioned as being necessary to set the parameters of the learning task and outline expectations for outcomes. This was to be matched with a report-back session of some sort where once again, an emphasis was on delivery to the whole group. Collaborative efforts were imagined as involving several stages, with subsets of the groups in twos and threes working on research, while sessions that involved the whole group were to be empowered by technology. From the start, the project space was also thought of as serving a function for independent student sessions as well as for timetabled teaching.

### What happens here? (Pedagogy)

Current trends in learning space design and development are influenced by social constructivist approaches to teaching and learning (Brown & Long, 2006) which places greater emphasis on the collaborative aspects of teaching and learning. This is in line with Vygotsky's views that social interactions are a crucial element in the learning process (Vygotsky, 1975). The spaces at both St Lucia and Gatton are intended to foster both collaborative teaching, through using the spaces for timetabled classes, and collaborative learning by opening the spaces to student use when not used for teaching. This is in keeping with social constructivist approaches to teaching and learning and supported by the design philosophy outlined above. This intended use is fostered by the open

design of the spaces, the presentation technologies and the sharing of computers. The CTLCs are also designed to foster active and engaging approaches to teaching and learning, through providing technology rich spaces that can be reconfigured to cater for a variety of teaching and learning purposes and activities (Brown & Lippincott, 2003). Providing for a range of learning activities is intended to meet the pedagogical needs of the 'net generation', major users of these spaces, who, amongst other characteristics have a particular preference for variety in their learning (Lomas & Oblinger, 2006). These pedagogical aspects of the space are supported by design of both technology and space aspects and demonstrate the pedagogy, technology relationship.

### How is the space used? (Space)

Clearly, space and fittings are going to play a key role in encouraging interaction and collaboration. Just as the individual tablet-arm furnishing of a tiered theatre inhibits discursive behaviour, seating and benching must become enablers in any collaborative space. The initial design made several kinds of provision for group work. Architect Hamilton Wilson deliberately varied elements such as group size in order to test the effect on instructional outcomes. However several more subtle effects were also tested between the 'large' and 'small' collaborative spaces.

The larger rooms were seen as active noisy spaces. These rooms are predominantly white and light with the ability to moderate the space through lighting and screens. The other space is a more introverted 'quieter' space which is timber clad and warm with an organic, less structured feel (Wilson, 2008).

Though not fully tested by data collection to date, anecdotal evidence and commentaries have demonstrated that the distinctive architecture of the key spaces in the Sir James Foots CTLC has played a key role in the uptake of the rooms. The shapes are unlike any traditional space and announce clearly that different activities are expected and encouraged.

### How is technology used? (Technology)

The categorisation of expected behaviours into independent study, teacher-led and group work led directly to the decision to use technology to not only facilitate these sets of activities but to signal expected behaviours and highlight the transitions between modes. As it was recognised that these kinds of teaching sessions would be new to both students and academics, it was felt that 'signposting' the changes between formal presentations, group tasks and unstructured work was beneficial. The technology uses moving physical elements (such as electric screens, monitor lifts and blinds); lighting changes and directional audio cues to clarify expectations and assist the academic to remain in control of the session.

While the spaces are undoubtedly technology-rich, careful consideration was given to providing appropriate low-tech alternatives and to limiting complexity to foster uptake and optimise ease of use. Document cameras were provided specifically to stimulate brain-storming sessions using handwritten notes, diagrams or mind-maps. While whiteboards might serve a similar purpose, the document cameras allowed instant capture to PC, allowing the sessions to be recorded and shared amongst the group. Similarly, no specific collaborative software is installed in the CTLC. Such systems often impose significant learning curves, taking valuable class time better spent on learning tasks. Many common tools, ranging from simple email to web based aids such as Google Docs and wikis, have been successfully applied by groups using the CTLC with minimal time spent on process.

The goal was always to use technology to focus the learning, and not allow the technology to become the focus of the learning.

### How was the facility evaluated?

Both the St Lucia CTLC and the Gatton R-CTLC are considered to be highly successful. Apart from the more formal evaluation strategies outlined

below, success has been judged by usage and students and staff at both campuses have been enthusiastic in their use of the CTLCs from the beginning. According to room booking statistics, the timetabled usage of the St Lucia CTLC is about 70 percent. Outside of timetabled classes the spaces are commonly used for individual and collaborative learning student activities. Equally, the R-CTLC is heavily utilised at Gatton and students have requested later closing hours of the space to make further use of it. Further evidence of this success is seen in the increasing demand for these kinds of spaces on campus. In particular, the success of the spaces in terms of independent use by students has encouraged the building of several collaborative learning spaces based around identifiable cohorts such as the First Year Engineering Learning Centre.

A comprehensive evaluation of the CTLCs was conducted at St Lucia in 2006 and at St Lucia and Gatton in 2007. As these spaces are designated as both teaching and learning spaces the evaluation of the CTLCs sought to:

- Identify the ways in which both staff and students use the centre for teaching and learning activities;
- Identify the pedagogical approaches being adopted in the centres; and
- Identify the strengths and weaknesses in space and technology design and fit-out of the new learning spaces to inform further learning space developments.

Data was collected via institutional data (e.g. room booking data) observations of students; surveys of randomly selected students; surveys of randomly selected staff teaching in the centre and semi structured interviews with selected staff. There was also informal data supplied anecdotally.

Observations of student usage of the St Lucia CTLC were conducted at the beginning the middle and the end of the semester. 180 randomly selected students completed the survey. These students were using the centre on the same day and were selected from all the rooms and spaces

in the centre. Surveys were sent out to 80 staff listed as completing the training at the St Lucia CTLC; 25 staff completed the surveys.

Data from Gatton was obtained through the same approach. The survey was sent to 20 staff and seven staff completed the Gatton survey. Thirty students completed the student survey and participated in the observation activities. Additional data was also supplied by an individual lecturer's research into the Gatton R-CTLC using student evaluations and an email poll of staff.

Observations of the space and feedback from the surveys indicate that teaching and learning activities vary from innovative and collaborative uses of the space to more traditional didactic teaching and learning uses. For some lecturers the opportunities provided by the space to engage in collaborative teaching and learning encouraged a range of collaborative activities, utilising the different modes of the spaces and integrating online learning tools, presentation technologies and group activities. Case studies were collected in the form of recorded interviews with six academics whose work covered different methods and fields of study.

In many cases, particularly in the smaller collaborative room at St Lucia and as indicated by the architect's intentions outlined above, observations confirm that the space itself is utilised for group activities, with little use of the technology. Students often work in groups around the tables in the centre of the rooms, forming and reforming in informal ways for different aspects of their learning activities, facilitated by the lecturer. These applications demonstrate the space-pedagogy relationships of the CTLC, particularly the importance placed on face-to-face collaboration without necessarily having to utilise technologically mediated collaboration.

In individual study time, observations have shown that students also use the spaces for collaborative activities. Feedback from the student surveys indicates that 50 percent of St Lucia students using the CTLC use the space for collaborative learning activities (as opposed to the more usual

individual, private study activities expected in libraries and similar spaces). The R-CTLC is also popular for collaborative learning activities outside of timetabled usage and students have indicated they would like more access to this space.

While many teaching applications of the CTLCs are in line with the intended usage, observations indicate that much teaching still takes traditional approaches and does not attempt to utilise the spaces for any kind of collaboration in the way that it is intended. The St Lucia staff survey also indicates that no lecturers are using the videoconferencing facilities or access grid applications available in the externally focussed collaboration rooms. Statistics obtained from room bookings indicate that the videoconferencing and access grid rooms, while heavily booked, are highly under-utilised for their intended applications.

### **Which aspects of the space design and equipment worked and which did not?**

The original CTLC was blatantly experimental in its space and technology design. Indeed, there are radical differences in both the space design and the technology response between the 'large' and 'small' collaborative spaces in the Sir James Foots Building. In the realisation of the 'second-generation' space at the Gatton R-CTLC, a conscious attempt was made to respond to at least the expressed views of the academics and students by changing the design. In reality, the Gatton space imposed its own constraints, which made the project different in its own right and added constraints on the type of space design that could be realised.

While a full, evidence-based analysis was not carried out as an input to the new design, the tables below demonstrate that the 'pedagogy-space-technology' analysis had some utility in suggesting the broad areas in which design responses would be best suited to improve the usability of the new space.

The ability to move seamlessly between the different modes of teaching and learning is a



Table 1. Aspects of the CTLC and R-CTLC which students identified as successful.

St Lucia CTLC	Rank	Category	Why
Layout of spaces – structured to support group work; comfortable	20%	Space/ Technology	Design of pods, integration of technology, ease of use
Access to space and working areas	18.5%	Space	Design intention focusing on space to collaborate
Access to multiple computers	13%	Technology	Supported both the individuals and the groups
Good presentation resources	10%	Technology	Provision of a range of presentation options available to groups
The rooms enable group interaction	9%	Pedagogy	Design of pods, ability to work easily in groups
Gatton R-CTLC			
Pods supportive of group work	35%	Pedagogy	Self contained tables with presentation resources and computer / online access/ addressed need for smaller group areas
Being able to share work on big screen, allowing input from everyone	16%	Technology	Incorporation of the plasma screen into the pod allows for ease of sharing- improvement on St Lucia CTLC
Different mode designs	10%	Technology	Positive aspect of St Lucia CTLC. Supports seamless change between different teaching and learning activities-minimal disruption.
Open spaces to encourage group work	5%	Space	Retained group interaction spaces identified as a positive in St Lucia CTLC-identified best used elements and retained/improved

positive feature of the St Lucia CTLC, and one that lecturers found particularly beneficial. This aspect has been incorporated in the epod model at the R-CTLC and the new CTLC in GPN4 in St Lucia.

Staff and students identify the presentation options at both CTLCs as a highly successfully aspect of the design. While the spaces are undoubtedly successful there are still improvements that would increase functioning and satisfaction with the spaces. Some of the main requests for improvements and the response to these requests are outlined in the Table 2.

### What technologies were most effective at enhancing learning and teaching?

The survey results indicated that staff at the St Lucia CTLC have viewed favourably the range of options for presentation in particular the document camera and large screens in the pods. This is seen as being very valuable to supporting collaborative learning, allowing students to share and discuss their work easily.

This is also the experience of the staff and students at the R-CTLC. Students at Gatton find the epods to be extremely beneficial for collaborative activities, particularly the large screens in each epod that enable easy sharing of work.

“The big screen allows you to bring up what’s on one person’s computer, so everyone can see what’s being typed, allows everyone to have input, table allows everyone to see each other” (Gatton student).

Table 2. Aspects of the CTLC and R-CTLC which students identified as problematic.

St Lucia CTLC	Data source	Category	Response
Smaller group areas for teaching	Verbal feedback from staff using the CTLC	Space / Pedagogy	Design layout to allow 2/4/10 groupings using more pods and smaller tables / group zones
Ability to project individual pod materials onto the main screen when not in pod mode	33% staff survey	Technology / Pedagogy	Move to LCD screens instead of projectors and allow use in 'individual' mode
Better whiteboards in the smaller rooms	33% responses Staff surveys	Space / Technology	Flat walls provide better opportunities for whiteboards – maximize use by placing adjacent to each pod
Some indication the room is in use	25% responses staff survey 20% responses student surveys, plus anecdotal	Technology	St Lucia: retrofit 'room-in-use' lights that function when an academic logs into the lectern Other: fit 'room-in-use' lights
More of these kinds of spaces (for both teaching and student independent learning)	25% responses student surveys	Pedagogy/ Space/ Technology	Create more CTLC spaces; create other new learning spaces such as Engineering Learning Centre (two built, one in planning ) and Science Learning Centre
More useful catering facilities/more eating areas	10% responses in staff & student surveys	Space	Not acted on due to associated problems
R-CTLC	Data source	Category	Response
Reliability of computers	20% of responses staff survey 50% of responses student surveys	Technology	Optimize common image provided to PCs
Improving the location of the screens for seminar	28% of responses staff survey	Space	Move to spoke and wheel space design to optimize sight lines to main seminar screens
Providing more desk space without computers	15% of responses staff survey plus anecdotal feedback	Space	Refine desk design to provide more clear space. Provide occasional furniture without PCs at the front and sides of the room
Location of the printer	10% in staff survey 5% student survey	Space / Technology	Printer moved to an accessible in-room location in Gen 3 at GPN4

### What were the main lessons learned?

As much as the technology, staff and students find the 'space' in the CTLC useful for a whole range of activities including role plays. The spaces provide considerable flexibility for a wide range of teaching and learning activities. This was particularly apparent in the smaller CTLC rooms at St Lucia where the table legs were damaged by being moved around. This small issue has now been addressed by placing casters on the tables and strengthening the table frames.

In the observations conducted at Gatton, the ways in which students participated in collaborative learning was particularly interesting. Students moved between individual work to group work and back. They worked individually on tasks, from time to time using the large screens in the pod to share and discuss their work, then moving back to individual work again.

A key aspect of the evaluations was the ability to use the information to refine further developments. In studying emerging issues,

responding with appropriate design changes to the 'next generation' space, and then repeating the studies, we were engaging in a process similar to the Action Research Cycle (Carr & Kemmis, 1986; Kemmis & McTaggart, 1988). It is rare that cascading projects of this nature provide an opportunity for continuous improvement and the technology design at least, overtly used the inputs available to produce improved outcomes.

### What would you do differently next time?

User training and careful evaluation of the strengths and shortcomings of each succeeding project are both key to producing better and more cost-effective teaching and learning spaces. While the three generations of CTLC UQ have so far produced demonstrable improvements, more time for evaluation and consolidation of practice between projects might have produced even better outcomes.

Keeping a budget provision to go back after 12 months and correct shortcomings that have emerged in fit-out or technology is also a powerful (though rarely exercised) tool.

The crucial lesson that emerges from the experience of the CTLC and its derivatives is that successful design is a collaborative process and not a 'cookie cutter' template that can be applied to differing places and spaces. Without appropriate involvement and feedback from users and managers of the proposed facilities and interaction during the design phase between the requirements of the pedagogy, the space and the technology, the chances of creating an expensive white elephant increase exponentially with budget.

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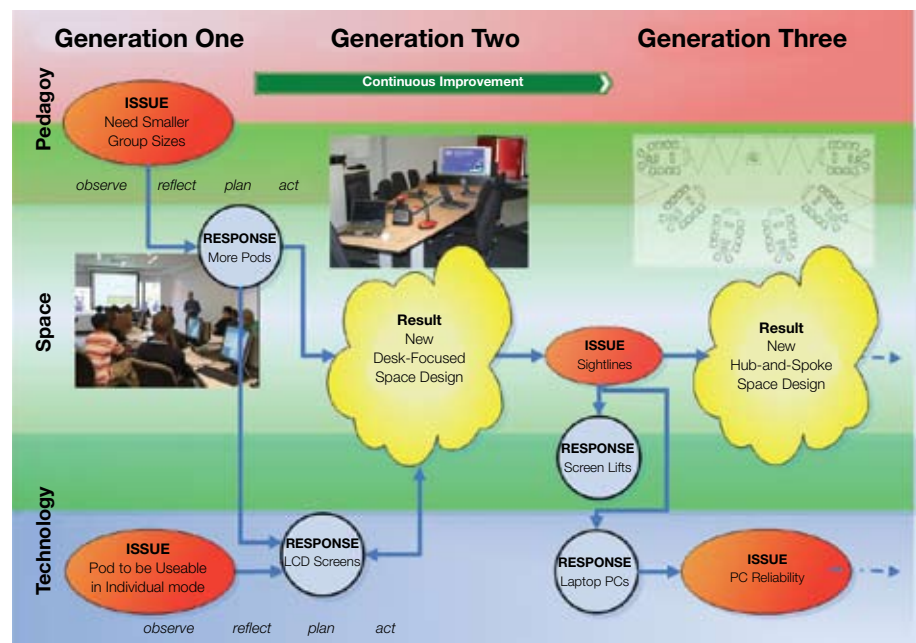


Figure 1: PST Analysis which shows the development of several design elements and identifies the stages as analogous to the action research cycle 'plan, act, observe, and reflect'.

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