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Good practice report: curriculum renewal

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Overview

This report serves as an overview of the work funded by the ALTC in the area of curriculum renewal in higher education and makes recommendations for future work in the area.

ALTC has funded 40 completed projects and seven fellowships in this area, and the outcomes of each are summarised in this report, along with a comprehensive literature review of recent national and international research and practice in the areas of curriculum renewal in higher education.

The projects and fellowships that helped determine good practice come from various discipline areas such as biology, physics, chemistry, maths, histology, pharmacology, studio arts, music, teacher education, construction, computer science, ICT, new media, engineering, health, occupational therapy, philosophy, sociology, social work, psychology, and veterinary science.

Some of the major themes that emerge from these completed Australian projects and fellowships that relate to good practice in curriculum renewal within higher education are standardisation of both graduate attributes and assessment practices in line with real-world and industry needs while keeping in mind the critical thinking and problem-solving skills needed in future researchers and future educators. Each of these projects focuses of one or more of these inter-related issues and suggests solutions and strategies based on their project outcomes. The major theme that emerges from all these projects is the need for a change of culture and curricular processes not just at the organisational level, but also at the fundamental level of the educators themselves, who deal with students every day, and are closest to the needs, aspirations, learning, and growth of the students.

A literature review of the discussion and debate in this area reveals similar needs and issues worldwide. Technology-assisted learning and teaching along with industry engagement has addressed some of these needs and issues, but while technology can enrich learners' learning and engagement if done right, it has the opposite effect on learning and teaching if the delivery is poorly executed.

Finally, this report makes some recommendations for good practice based upon the outcomes of these and other studies in the area.

Literature review of Australian and international scholarly research and publications

Best Practice in Curriculum Renewal

Curriculum renewal in higher education ought to be a continuous, evidence-based process with measurable outcomes. In fields as such ICT, engineering, and biotechnology, continuous curriculum review and renewal is mandatory in order to remain current (Borin et al., 2007; Desha et al., 2009). Quality assurance practices require continuous self-examination and evaluation (Briggs, 2007) even for disciplines experiencing more moderate rates of change such as the arts, social sciences and languages. Educators need to be in the forefront of developing ideas, trends, and innovations for their disciplines to remain relevant.

They also need to be aware of evolving political and social changes, and global issues like climate change and the need for sustainable development to prepare tomorrow's professionals and leaders (Chhokar, 2010; Muijen, 2004). National drivers, such as TEQSA (Tertiary Education Quality and Standards Agency) and Australian university mission-based Compacts (DEEWR, 2010) also spur us to revise and improve our curriculum. Following a quality assurance model, curriculum design and change should be a combined effort of teaching staff, administrators, researchers, students, and potential employers (Briggs, 2007; Navehebrahim, 2009). Involvement of all stakeholders in the renewal process can produce an end result that is vital, practical, and prepares graduates for immediate entry into a competitive workforce (Fleischmann, 2010).

Elements of Curriculum Renewal

Several key elements need to be present for curriculum renewal to be relevant and successful.

Quantifiable graduate attributes

Continuous curriculum renewal needs to focus on key skills or attributes, and authentic learning experiences acquired either externally to the institution, in simulations or problem-based learning (Katajavuori et al., 2006). An evidence-based process requires data to measure the success of the outcome. Graduate attributes are measurable outcomes of higher education curricula (Hietala et al., 2004). Graduate attributes are an important driver of curricular change and evolution. The concept that all graduates ought to have mastered certain skills and abilities is a longstanding one (Levander and Mikkola, 2009). Institutions recognise that the application of international standards to graduate attributes allows for greater translation of graduate qualifications across geographical and cultural space (Portela et al., 2009). International Organization for Standardization (ISO) standards in the business world and the Bologna process in the educational sphere have increased the need for standardisation in order to communicate global qualifications (Lliexa et al., 2009). The description by Portela et al. of the coexistence of old and new systems of degree granting sometimes within the same institution outlines clearly how complicated achieving standardisation can be (2009). By standardising graduate attributes, the meaning and implication of a tertiary degree are made more comprehensible to potential employers. Students pursing a graduate degree are similarly educated; hence, reducing the need for any remedial work done either as part of their degree plan or independently in order to fill a personal gap in preparatory education (Jaffer, Ng'ambi and Czerniewicz, 2007). The idea of standardised graduate attributes is still an evolving one, with many variations on the same theme. While the idea of international standards is an attractive one, the

reality of institutional overhaul can be daunting (Portela et al., 2009).

Collaboration and authentic learning

Collaboration is another key element for best practice in curriculum renewal. Engaging stakeholders in the process means surveying the needs of many diverse groups with an interest in the end product of higher education: the qualified graduate (Nygaard, Højlt and Hermansen, 2008). While traditionally the faculty and staff have had the largest say in curriculum design, engaging all stakeholders means bringing in industry representatives and future employers, and especially the students themselves (Wiklund and Wiklund, 1999). As students begin to have an active role in curriculum design, authentic learning experiences, those taking place in the real world in an internship or applied situation, are more important both as a way of giving students desirable work experience before they begin an employment search but also as a nexus between two stakeholder groups in the curriculum design process: the students and their future employers (Nygaard, Højlt and Hermansen, 2008). The value of the authentic learning experience is evident in reports of alumni who attribute their network of supportive employers or potential employers to their student work-integrated learning (WIL) (Patrick et al., 2009). WIL enables students to discover practical applications and connections between their learning and the mentoring they receive from supervisors while acquiring the kind of experience that makes them more desirable as employees (Katajavuori et al., 2006). While internships are highly desirable, authentic learning experiences can also take place in a classroom or lab-simulations of reality (Hajnal and Riordan, 2004).

Engaging in simulated experiences or problem-based learning can promote the same types of behaviours that having an internship can, without the ramifications of inexperienced supervisors in fields such as health where experience is crucial (Huntington et al., 2009). Authentic learning can also take place in problem-based learning approaches to education, where curricular material is presented in the form of problems needing to be solved using the skill sets being taught in the class. Problem-based learning (PBL) not only gives students a practical application of their skills but fosters collaboration as they work towards a shared goal of solving a defined problem (O'Neill and Hung, 2010; Savin-Baden, 2008; Leroy, van den Bosch and Ligthart, 2001).

Global change driving curriculum

As leaders of global change and innovation, institutions are key drivers of both social and political change. Facing a shared global challenge such as that of climate change requires a prompt and targeted curriculum review and overhaul in order to directly address change through education (Junyent and Geli de Ciurana, 2008). International collaboration of the type that will be required in order to effect lasting change in the ways in which humans interact with their planet need to start with the education of tomorrow's professionals, leaders and educators (Junyent and Geli de Ciurana, 2008). Changing attitudes can begin at a very young age, but societal change needs the combined and sustained work of those provided with a toolkit that allows them to solve the planet's most pressing problems (Scott and Gough, 2006; Muijen, 2004; Chhokar, 2010). Information regarding these issues needs to be built into curriculum from the ground up (Meyers and Nulty, 2009). Sometimes that results in new departments, course offerings or even regional centres, but more often it can mean adjusting the underpinnings of the curriculum to include specific foci in areas of particular import (Dahms, McMartin and Petry, 2008; Meyers and Nulty, 2009). Disciplines such as engineering that have a direct relationship with sustainable development technologies face an increased need for rapid curriculum renewal in order to keep up with industry, regulatory and accreditation shifts (Desha et al., 2009).

Development of online and digital tools

Online and digital tools continue to affect the rate and the path of curriculum design. The ability to provide a generation of gamers with familiar technology to enhance their learning is one of the motivations behind virtual worlds and other web 2.0 and digital toolkits (Luke, 2003). Social media and blogging also provide a way for students, instructors and the larger community to engage and discuss ways that the technologically-savvy students of the 21st century feel comfortable with (Rabikowska, 2008). The challenge is not for the students to engage with this technology. It is for the academic staff (Prensky, 2001) to see beyond the need to cram content into their curriculum, recognise the problem-solving and information-seeking types of skills these students bring with them to the classroom, and move beyond centuries of standard teaching delivery mechanisms. Transposing the old teaching-and-learning methods into the new medium does not work well. It is timely to consider how to engage this generation at a whole-of-course level.

Interaction online is merely the icing on the cake. Technology holds the perhaps ephemeral promise of making up for a less than adequate high school education and giving students an understanding of complex ideas and disciplines in a short amount of time without having to master some of the skills that have previously held their counterparts back from full participation at a tertiary level (Luke, 2003; Jaffer, Ng'ambi and Czerniewicz, 2007). This includes tools that enable distance education. With the establishment of online educational platforms, distance education has become a standard path or option at many institutions. Online access to higher education has necessitated a change in curriculum design in terms of both assessment practices and instructional delivery (Naidu, 2006). The import of online tools has grown in order to avoid course offerings that might be too text-heavy for learners who do not perform their best in a reading-intensive environment, although alternative uses of the technologies available need more exploration (Naidu, 2007; Petrides et al., 2011). Virtual worlds and virtual replacements for traditional tools offer a learning environment that is not bound by physical objects but rather offers learning in a form that can be embraced by more people in more locations with varying access rates to traditional equipment (Jaffer, Ng'ambi and Czerniewicz, 2007; Roussel, 1999).

Addressing internationalism, diversity and equality of access

Internationalism in some departments comprises a significant proportion of the student population (Trice and Yoo, 2007; Luxon and Peelo, 2009) for nations such as United States, the United Kingdom and Australia. Internationalism within institutions can be a true asset, creating networks among students and faculty that exist beyond graduation and enlarging and enriching the university experience for everyone (Peelo and Luxon, 2007). While the internationalisation of education has distinct advantages, criticisms are inherent in the fact that "international" still means English-dominated and languages other than English are at a disadvantage in the global educational community (Ogachi, 2009). For students from many parts of the globe, attending university means being educated in a language that is not their first (Mgqwashu, 2009). Students attending university in one of these target countries may require English Language Education (ELE), English for Academic Purposes (EAP), or English as a Second Language (ESL) classes in order to succeed in their discipline (Peelo and Luxon, 2007; Luxon and Peelo, 2009; Waters, 2009). Instructors in departments enrolling high proportions of non-native English speakers need to have excellent communication skills and sufficient institutional support.

However, a curriculum which addresses diversity goes beyond attention to language difference. To be inclusive of diverse cultures, curriculum design needs to incorporate and make space for diverse ways of thinking and learning (Archer, 2010; Evans et al., 2003; Hay, 2008; Peelo and Luxon, 2007; Sayles-Hannon, 2009).

Archer proposes that curriculum be reciprocal where the experiences and thought processes of the students are brought to the table (2010).

Diversity in the student base means different approaches to the learning and teaching material are required. When a dynamic lecture is replaced by a static video or even a transcript of lecture materials used and reused semester after semester, the quality of instruction is no longer tailored to the group of enrolled individuals who may have their own needs, questions, and desires, but rather to an idea of what those individuals may require in order to satisfy assessment goals set up by the university (Naidu, 2006). To address these challenges, students need to be engaged in how the curriculum should be renewed. It also means students need to be active agents in the design of their own curriculum (Tsai and Shen, 2011).

Being an active participant in the process can range from being involved in determining one's educational direction, to becoming self-aware as learners in a transformative educational journey (Duerr, Zajonc and Dana, 2003; Yuksel, 2010; Gormally et al., 2011). Increasingly students are also expected to be autonomous learners, engaging materials on their own with less time spent guided by an instructor (Bosco and Rodriguez-Gomez, 2011). Creating autonomous learners out of tertiary students means building those skills into the curriculum (Meyers and Nulty, 2009). New and social media and publishing techniques and technologies such as blogs, wikis, tweets, podcasts, YouTube and other outlets can be used to publish and present student work. These tools can engage and motivate students and when they are combined with students' reflective essays, students will improve their writing and communication skills (Rifkin et al., 2010).

To a large extent, technology allows traditional curriculum to accommodate diversity. Diverse learning styles, ability to travel to university centres and knowledge of technical equipment can all be accommodated in a distance-learning environment equipped with the latest online tools (de Salas and Ellis, 2006). Nevertheless, there are also challenges to address. The disadvantage of distance learning is that face time with instructional staff is reduced to almost nothing at all. Access to higher education continues to be a problem facing many parts of the world where infrastructure is less than adequate and the communications grid that many take for granted might not be available (Hayden and Thiep, 2007; Basaza, Milman and Wright, 2010). Access to computing or connectivity is also variable due to socio-economic factors (Naidu, 2006; Hanafizadeh, Khodabakhshi and Hanafizadeh, 2011).

Curriculum renewal in any discipline or institution needs to address these issues for the changes to be relevant and sustainable.

Pathways to achieving effective curriculum renewal

As has been shown above, best practice for curriculum renewal in higher education addresses diversity, fosters collaboration, engages stakeholders, maintains international standards for graduate attributes and produces qualified graduates. Engaging stakeholders and encouraging student-directed development is merely the beginning. Curriculum renewal is a messy process. A replicable, quantifiable process that continuously engaged and assessed helps make curriculum possible. The question remains as to how this is to be best accomplished. Some of the theories that inform best practices in curriculum renewal are discussed below.

Actor-network theory
Actor-network theory offers one way of thinking that includes human and non-human agents in the process. Actors in the academic experience can be faculty, students, community members and administrators but also computer networks, software, and university infrastructure (Tatnall, 2010).

Cognitive development theory
Cognitive development theory matches teaching and learning to ways in which students engage and process information at different stages in their development as academics (Yordy, 2008). Incorporating current faculty research about teaching and learning is needed to guide the process of curriculum renewal (Zundel and Mengel, 2007). All this can only be accomplished in an environment of institutional and administrative support (Zundel and Mengel, 2007). An international body of research into the first year experience has been accumulating over the last decade, directing curriculum design to develop course content where a student's personal, social and academic transitions are supported in a more inclusive manner (Nelson et al., 2006) and where the traditional content is supplemented and supported by inquiry-based and research-based laboratory pedagogies, especially in the STEM disciplines (science, technology, engineering, and maths) for a more active learning environment (Weaver, Russel and Wink, 2008).

Inverted curriculum
The so-called inverted curriculum is one such approach that combines both research-based and practicals-based course design that aims to expose first year students to higher year level hands-on practical experiences, in order to engage the student early while at the same time allowing the students to discover for themselves what traditional subjects they need to understand in order to achieve their goals (Weaver et al., 2008). The principle of the inverted curriculum is a term borrowed from debates on electrical engineering education (Cohen, 1987) where the student's own motivation to achieve self-declared goals and ambitions contribute to greater proactive learning, leading to a 'progressive opening of the black boxes,' (Meyer, 1997), a somewhat longer but more precise description.

Complexity theory
Due to the complex and in some cases arduous processes of curriculum renewal and redesign, complexity theory has been proposed as a helpful model, in which design emerges from participant groups rather than from centrally managed processes (Burgess, 2004). Utilising a distributed model such as complexity theory to address curriculum design can encourage creativity over conformity (Burgess, 2004).

Course integration
Course integration, in which central attributes of the educational process are included in all course offerings and in which courses build on the knowledge acquired in previous work is a strategy that is successful and popular with students and industry representatives (McGann et al., 2007).

Knowledge-based economy concept
Despite the recent popularity of the knowledge-based economy concept and its reliance on business models for the academic process, some researchers propose that curriculum redesign needs to be accomplished within a framework that examines and assesses concepts critically, saving what is useful and discarding the irrelevant (Lambert, Parker and Neary, 2007). Maintaining critical thinking at the core of the academic process can inform the relationship between researchers, teaching staff and students in a way in which the commodification of research at the expense of teaching and learning cannot (Lambert, Parker and Neary, 2007).

Liberal arts emphasis
Best practice for curriculum renewal also emphasises liberal arts as it provides the "essential learning outcomes for college students" (AACU, 2007). These outcomes are the ones traditionally associated with a liberal arts education:

- high skill levels in critical thinking, communication, moral discernment, and

individual and cooperative problem solving
- knowledge of human cultures, the physical and natural worlds
- attitudes of civic engagement and multicultural awareness
- commitment to integrative and lifelong learning (AACU, 2007; Morrel and Zimmerman, 2008).

Thus, professional- and career-oriented curriculum should also include liberal-arts components within its sphere, and this can be achieved through a general education during the early years of higher education irrespective of discipline where the mastery of areas of content will follow the development of an inquiring mind and the ability to respond intelligently to a set of ideas (Zabarowska, 1995).

Total faculty collaboration

Total faculty collaboration has been proposed as a model for the curriculum renewal process. One institution accomplishes this through faculty workshops three times a year. These workshops with their common meals and collaborative sessions promote community building among the faculty (Zundel and Mengel, 2007). McGann et al. discuss creating a "shared vision" among faculty by way of a structured process and required weekly meetings to reform the curriculum (2007). This structured process prevents each faculty member from promoting an individual agenda. Discussions were kept at a strategic level to avoid fragmentation (McGann et al., 2007). Borin, Metcalf and Tietje in their 2007 article on curriculum innovation describe a process that requires a faculty commitment from all tenure-track faculty rather than utilisation of a curriculum committee. This total faculty collaboration promotes comprehensive and integrated continuous curriculum renewal. Faculty members require support in the form of supplementary salary or course release time or teaching relief (Borin, Metcalf and Tietje, 2007) because of its time-consuming nature.

Continuous renewal cycle

Curricular renewal needs to be a continuous process. While this is a common and well-understood (if not always well-followed) concept in the business world thanks to the popularity of the total quality management (TQM) business model, Briggs suggests in her study of continuous program renewal that academics may prefer to encounter these same concepts in the guise of the values of academic excellence and ongoing professional development (2007). It is also suggested that continuous and collaborative curriculum renewal needs to be accomplished at least at a departmental level and not by individual faculty members. Individual efforts may result in further fragmentation rather than the cohesive product that is the desirable outcome of collaborative design (Briggs, 2007). Briggs further recommends that the idea of *teamwork* as a collaborative model be replaced with the concept of a *community of practice* in which informal as well as formal efforts are recognised and rewarded.

> A communities of practice framework encourages a conception of curriculum leadership that is distributed rather than hierarchical and that calls on each faculty member and chair to consider his or her own opportunities to contribute to improved curriculum practice. Most importantly, a community of practice framework suggests that climates conducive to curriculum collaboration are created not by formal structures and directive leadership but by a combination of enculturation, freedom and support to experiment, and informal opportunities and individual actions that provide examples and inspiration to others to strive for excellence in curriculum practice (Briggs, 2007, 706).

While the use of business models to inform academic processes is resisted by some in academia as an example of commodification, true critical discernment

takes the best of all available sources and incorporates it into a working process that creates a successful outcome. TQM and quality assurance processes, while created to inform business management, can be useful models in which to craft the framework for continuous improvement necessary for sustainable curriculum renewal processes (Wiklund and Wiklund, 1999). Concrete examples of continuous improvement in curriculum have been posited by Hill (2007), as a tri-annual review effected by qualitative surveys, a review of core competencies, and detailed but generalised assessment rubrics to inform students and instructors.

Conclusion

Curriculum renewal in higher education can be difficult, time-consuming, and arduous, but the payoff is a curriculum that is current, responsive, proactive, and effective. Maintaining a culture of continuous improvement, informed by research and developed collaboratively, can produce lifelong learners equipped to be leaders in their professions. Engaging students as stakeholders in the curriculum renewal process can transmit a culture of excellence and continuous improvement as one of their graduate attributes. Encouraging diversity by increasing methods of access as well as making space for different cultures of learning and thinking can enrich the educational process for local and international students. Fostering creativity through diversity as well as keeping pace with technological innovation, evolving regulations and accreditation schemes can create leaders, professionals, and future educators able to navigate change and solve challenging global problems. Despite the challenge in implementation, it would appear that continuous curriculum renewal is worth the effort.

Recommendations

The projects, fellowships and literature included in this report suggest some much-needed changes for higher education in Australia. They are as follows:

1. Creating clear and accessible career pathways for students during their higher education journey.
    - Learning pathways must provide for a variety of both mainstream professional careers and alternative work outcomes including future educators, future researchers, future leaders, and future entrepreneurs.
2. Clearly articulating threshold graduate attributes or outcomes.
    - Mapping attributes to coursework
    - Documenting/showcasing them in an accessible manner for industry, community, government organisations or professional bodies.
3. Aligning education pathways to meet national and international industry needs.
    - This can only be achieved through a constant and continual partnership with industry and other stakeholders.
    - Collaborating with industry to anticipate the future needs of the workforce.
    - Building hands-on and work-integrated learning opportunities and internships for students through partnerships with industry.
    - Encouraging globally portable graduates through internationalisation of the curriculum and study aboard opportunities.
4. Emphasising the interdisciplinary, intercultural, and global nature of modern knowledge.
    - Modelling real-world environments rather than replicating existing silos of faculties/disciplines or national boundaries.
    - Providing a more holistic education to our students by encouraging them to understand and appreciate the knowledge available from other disciplines through multi-disciplinary course offers in all programs.
    - Encouraging and promoting inter-departmental teaching and enrolment.
5. Empowering graduates for real-world work and life environments.
    - Emphasising skills such as teamwork, information literacy, technological literacy, critical thinking, problem solving, written communication, and interdisciplinary contexts.
    - Encouraging active and proactive learning to equip students to be open to lifelong learning.
    - Providing students with the tools to discern and apply professional ethics.
6. Equipping and developing staff to use and incorporate technology tools within the curriculum in a creative manner.
    - Staff should be encouraged to engage with and learn to use technology, and not just use it as a convenient assessment tool.
    - Technology used not as substitute for teaching but as an enhancement of it.
    - Developing staff expertise through peer mentoring and peer teaching models as part of curriculum design and renewal.
    - Creating resource repositories where educators can create and share teaching resources and reusable open-source teaching modules.
7. Recognising the emerging needs and different learning styles of our increasingly diverse and international student cohort.
    - Designing curricula and bridging programs that will help both the students and the educators.

All of the above can be achieved through a continuous cycle of curricular renewal. It is also suggested that organisational principles such as quality assessment and total quality management can be useful if applied to determine which aspects of the curriculum need an overhaul. Nevertheless, top-down efforts are not helpful unless they are accompanied by bottom-up and system-wide cultural change.

Conclusion

The Bradley Review challenged Australia to rethink higher education; to broaden our participation rates, and to encourage particularly participation from those traditionally excluded from the corridors of our institutions. At the same time, we have begun to recognise that our higher education system is failing to hold the attention of an increasingly diverse student body.

The reports collected here showcase how our academic community has attempted to meet the challenges of a changing higher education landscape. Each project/fellowship reported here has achieved some progress within its own arena, and, through specific and purposeful goals and outcomes, they serve as examples for future educators to consider.

In a country where higher education is a major export to an increasingly diverse student and academic body, there is a greater need to meet the demands that internationalism places on Australian curriculum. There is also pressure from a globalised and digitally connected society that calls for standardised graduate attributes in the curriculum and in graduates who enter the workforce in a global and increasingly technological context rather than just in a local or national context.

The projects, fellowships and literature included in this report suggest changes at the macro-, meso-, and micro- levels require a multi-faceted approach that involves collaborative efforts between higher education institutions and other organisations.

The challenge for every institution is to understand the competing needs of this paradigm shift. Some of the ways to achieve this is through an informed and systematic curriculum renewal.

Completed ALTC projects and fellowships

(The year at the end of each title is the year in which the project or fellowship is funded. Project/fellowship titles are live links to the resources.)

Architecture and building

Identification of teaching and instructional issues and opportunities for the construction management, quantity surveying and building surveying disciplines (DS7-618) (2007)

This project constitutes the first comprehensive study of construction education in Australia and provides an overview and analysis of the key issues facing construction education for university degrees in construction management, quantity and building surveying. Showcasing the discipline to all stakeholders was a key achievement of this report, along with raising awareness of the characteristics, issues, opportunities and boundaries of the discipline. It identifies challenges and opportunities as well as provides a foundation for future research in the field.

A survey of staff and students at 11 of the 12 institutions offering construction degrees, interviews and focus groups provided the data for the project. The Department of Employment, Education and Workplace Relations (DEEWR) and various other sources provided supplementary data. Fourteen recommendations were produced:

1. Improve funding of construction education based on current models to allow the discipline to reach teaching and research potentials.
2. Rationalise and integrate accreditation requirements by streamlining accreditation processes.
3. Address staff shortages based on an ageing workforce. Graduates need to be encouraged to enter academia.
4. Adopt strategic approaches to improve promotion rates by encouraging high-achieving students to apply for academic posts in construction disciplines.
5. Overcome fragmentation of curricula by incorporating mechanisms to help students understand how the components of their curriculum relate to each other.
6. Avoid overcrowding of curricula by offering guidance as to interdisciplinary approaches to coursework.
7. Address teaching and learning issues, possibly using the online resource portal mentioned in recommendation 14.
8. Exploit opportunities for work-integrated learning (WIL).
9. Expand and enhance assessment of teamwork, a significant core skill of construction.
10. Establish a forum for educational research, perhaps a biennial journal. As of the project's final report date, no such appropriate forum exists.
11. Balance students' work and study after conducting a comprehensive study of students' workloads. Many construction students combine work and study.
12. Establish a teaching-research nexus.
13. Improve communication between industry and academia by fostering clear communication channels.
14. Establish a portal for construction education resources. An exchange mechanism for communication between institutions is urgently needed.

As the first study of its kind in the construction discipline, this project aimed to develop an understanding of the key curriculum, teaching and instructional challenges facing construction disciplines in Australia and to benchmark best practice in Australia and internationally.

Notes:

1. The ALTC resources page for this website can be found at: http://www.altc.edu.au/resource-identification-teaching-construction-uon-2009

Architecture and building, and creative arts

Curriculum development in studio teaching (GI7-636) (2007)

Studio art can take many forms, although all can be described in some way as creative, reflective, focused on integrative design and absorbed in the culture of the endeavour. Studio teaching is also resource intensive and prone to budget cuts and staff reductions.

While the discipline continues to produce works of high calibre, stress levels due to workload and resource scarcity are issues that need to be addressed. This project focused on the identification, description and investigation of the circumstances and characteristics of studio teaching. It identified quality teaching and learning experiences that can serve as a model for curriculum development and shape institution policy with regard to appropriate resourcing of creative disciplines.

Studio-based learning is learning by doing: an investigative and creative process driven by research, exploration, experimentation, critique and reflection. It is distinguished by emphasis on project-based work, learning through praxis, workshop and first-hand observation. Studio assessment dimensions include concept resolution, presentation, interdisciplinarity, engagement, self-awareness and self-management.

These indicators need to be flexible to facilitate reflection, support developmental assessment, inform the design of studio tasks and the development of rubrics for assessment.

The project developed principles for the applications of studio assessment and a series of benchmark statements about effective practice in the studio for teachers and those involved in curriculum design, development and review.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-curriculum-development-studio-teaching-unsw-2010.
2. There is an online toolkit developed as a result of this project at www.studioteaching.org.
3. This study investigated and described the circumstances and characteristics of studio teaching models in the discipline areas of art, architecture, and design, and identified effective studio practice in each of these disciplines.
4. The project informs curriculum development, future practice and professional development for studio teachers.
5. It contributes to informed policy decisions affecting studio art.
6. The project draws on key sources including a comprehensive literature review, an online survey of academic staff, a survey of heads of school, and two national teaching forums.
7. Studio teaching is defined as learning through action.
8. Studio teaching encompasses all the elements contributing to establishing a milieu for creative actions, comprising the following four elements: a creative community of people and culture; a mode of teaching and learning characterised by critical reflection, small class sizes, and periods of face-to-face contact with teachers; a program of projects and activities that reflects and integrates professional practice; and a physical space, tools, equipment and technical assistance appropriate to project needs.

Creative arts

Scoping study for a national new media/electronic arts network (PP8-956) (2008)

The media arts scoping study project explores a national network of media arts practices in Australian institutions. The study's aim was to provide baseline data as to how the media/electronic arts curriculum has developed within the institution sector since 1975. The discipline is characterised by a rapid rate of technological change and requires most course materials to be reworked each semester.

Outcomes of the study include the establishment of the national organizations of media arts database (NOMAD) to facilitate the collection and presentation of relevant institutional information. A networked website for the collection and dissemination of data and a Wordpress website with the aim of demonstrating major events influencing the evolution of media/electronic arts within the Australian university structure were produced. A symposium was held to create focus groups and share knowledge. With the rapid rate of change in this discipline, key information was in danger of being lost due to lack of recording and reflection. Interviews with important educators to obtain first-hand accounts of information were a key element of the research for this project.

The NOMAD database made it easier to connect and collaborate in a previously isolated field. The research completed in this project will enable curriculum developments and opportunities for practice-led change.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-scoping-national-new-media-electronic-arts-cut-2009
2. NOMAD, the national organizations of media arts database was created and can be accessed from http://www.nomad.net.au/.
3. A website was created for the collections and dissemination of data regarding media/electronic arts and can be found at: http://mass.nomad.net.au/.
4. Priority was given to the preservation of first-hand accounts from key educators in the field.
5. Collaboration among previously autonomous groups was facilitated and found to be productive.

Education

Bridging gaps in music teacher education: developing exemplary practice models using peer collaboration (CG6-31) (2006)

The primary achievement of this collaborative project is the website Music Teachers Oz (MTO) that attempts to give preservice teachers a glimpse into real world music teaching via video case studies with professionals in various teaching situations. The website showcases the case studies as the primary learning resources offered, allows students to engage in authentic learning experiences and bridges the gap between generalist and specialist education theory and practice in the real world.

The website was hailed with very positive feedback by student users and educators, presented at various conferences and disseminated in several journal publications. In the process, national and international networks were formed. The website allows collaboration between education academics and the wider profession.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-bridging-gap-music-teacher-education-griffith-2009.
2. This project developed a website for music teachers, preservice teachers, academics and the general public to interact and discuss issues surrounding music education that can be accessed at http://www.musicteachersoz.org/.
3. Evaluations found that most users were satisfied with the capacity of the website to provide insight into actual teaching.
4. The project built and strengthened academic networks in the music education discipline.

Building capacity for assessment leadership via professional development and mentoring of course coordinators. Professor Merrilyn Goos (2006 ALTC Associate Fellow)

This fellowship program was designed to address a lack of cohesion in assessment practice at The University of Queensland, and to design a comprehensive best practice guide for the institution that could be used as a model in other institutions. Assessment is a part of the academic role which many newcomers find themselves inadequately prepared to address. This study creates a model of professional mentoring that brought together a pilot group of course coordinators to build a institution-wide assessment practice.

The fellowship program consisted of three phases, with Professor Goos acting as a role-model, broker, and academic developer who promoted cultural change among her peers. This was done in three phases.

Phase one was an information-gathering endeavour and consisted of survey and interview data collection. Participants included course coordinators, students, and senior institution managers. Their understanding of assessment practices and policies revealed conflict between the goals and expectations of these different groups.

Phase two of the fellowship involved community building around a pilot professional development and mentoring program for seven pairs of course coordinators. They represented a range of contrasting disciplines across six faculties. The attributes that were found to be vital to the approach were flexibility, diversity and choice. During this phase an institution-wide assessment network was established and has been maintained.

In the third phase of the fellowship, strategies were developed for embedding and sustaining good assessment practice. These include: additional funds to extend the mentoring model to middle managers; a review of UQ assessment policies; collaboration with an ALTC-funded project on assessment policy and impact on practice (PP8-874); and the dissemination of findings across the sector.

The results of this fellowship show that top-down change to instill cultural change from within does not work. Bottom-up change, although it aids in cultural change, cannot by itself achieve an institutional change. The key lies in a balance of leadership and mentoring. The goals of the course coordinators must be aligned to institutional policies and strategic plans and endorsed by senior management for change to happen.

In summary, good practice in criterion-referenced assessment can only be achieved through a combination of peer mentoring of course coordinators, brokering cultural and social change, and obtaining the acknowledgement, endorsement, and encouragement of senior management.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-building-capacity-goos-uq-2009
2. An analysis of the difference between students' and academics' understanding of the purposes of feedback was completed.
3. A pilot professional development and mentoring program for course coordinators from six faculties was developed.
4. An institution-wide assessment network was established, and has been maintained in a follow-up project building on the fellowship.

Building research supervision and training across Australian universities (GI7-631) (2007)

The place of knowledge in society is changing, along with resulting implications for higher education. This changing context affects research education for both supervisors and their students. This project sought to address these implications in the context of the following four major headings: professionalism and formalisation of research education; growth and diversity in research education; changes for supervision practices; and changes for supervisor development.

This study identified existing higher degree research supervisor training provisions as well as current and future needs of supervisors. It makes the following recommendations:

1. institutions provide additional ways of facilitating rich and sustained conversations about research education, and ensure systems and processes are in place to support such conversations.
2. institutions further support and develop leadership in research education at central and local/faculty levels.
3. the Australian Learning and Teaching Council (ALTC) commission a project on leadership in research education.
4. institutions ensure systems, guidelines and regulations be reviewed to ensure they keep pace with the changing nature of research education.
5. institutions further address the challenges faced by supervisors as a result of increased growth and diversity in research education.
6. the higher education sector and individual institutions further acknowledge and provide resources to address academic literacy in research education.
7. institutions address pressures on supervisors by identifying and responding to supervisors' major concerns in supervision.
8. institutions acknowledge the pressure of supervision when negotiating supervisors' workloads.
9. institutions review existing professional development programs to ensure they address the different needs of new and experienced supervisors.
10. institutions review existing and future resources for supervisor development.

Notes:

1. The ALTC resources page fro this project can be found at: http://www.altc.edu.au/resource-building-research-supervision-and-training-across-australian-universities-uts-2010.
2. The changing place of knowledge in contemporary society, and the implications for change in higher education are identified.
3. The expansion of institutions within a globalised and digital society, the more active involvement of government in institutions, emphasis on quality assurance (QA) and the impact of QA in research education are factors which impact on institution administration and individual faculties.
4. This project found that:
    a. Students doing research education are involved with other networks, communities and influences beyond that of their supervisor.
    b. Graduating research students are expected to have developed a range of generic skills, and are often expected to undertake their research education as part of a team.
5. Institutions and supervisors are advised to think more broadly about the total environment for higher education and the role of all stakeholders in research education.

Data repository for teacher education (DS7-617) (2007)

Quality research availability is an important component of teacher education, as effective teacher education creates a foundation from early childhood to post-school instruction. This ALTC-funded scoping study attempted to determine the feasibility, specifications, need and support for of a national data repository for teacher education (DRTE). This database would need to be systematically managed and maintained to provide usable data on teacher education and related areas.

The database proposed in this study could initially be made up of existing smaller data sets, but would need to be an ongoing, long-term project. Hosting would need to be done by a party with transparency with regard to funding and other key components of maintenance.

The study determined that there was indeed widespread support for the idea of a centrally accessible database for teacher education. It is the aim of this project to put the development of the database on the agenda of the Department of Education, Employment and Workplace Relations (DEEWR) for Commonwealth funding. This would possibly include location/hosting of the repository, data collection, and determination of responsibilities for preparatory and transitional tasks. Supplementary sources of funds may need to be sought as the DRTE is estimated to cost around $1.5 million to $2.0 million annually.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/project-enhancing-student-educational-murdoch-2006
2. This study investigated the need, support for, feasibility and specifications of a national data repository for teacher education (DRTE).
3. Data would be accessible and usable, concerned with teacher education and related areas.
4. The initial user interface on the website would include directions to a document repository, a public access data repository, and a full (restricted access) data repository.
5. Within the parameters set out in this report, the DRTE appears to be feasible.

Increasing institutional success in the integration and assessment of graduate attributes across the disciplines by identifying academic staff beliefs about graduate attributes (GI7-638) (2007)

Graduate attributes describe the skills and abilities that enable institution graduates to be well prepared for their entry into the workforce. The 'B Factor' project identified that academics' confidence and beliefs about graduate attributes affect their willingness to teach and assess graduate attributes. This project developed a framework to facilitate institutional plans for change aimed at increasing the integration of graduate attributes across the higher education sector, regardless of discipline.

A survey of 16 institutions' academic staff about their beliefs regarding graduate attributes was conducted. The institutions were chosen based on their focus on graduate attributes. The 36-question online survey investigated staff beliefs about graduate attributes and their importance for different disciplines; staff willingness and confidence to teach and assess them; any perceived obstacles to this work; and suggestions as to how to overcome challenges.

The graduate attributes included in the survey were those listed by Australian institutions, identified as important on various industry and professional organisation lists and those included in the graduate skills assessment project by the Australian Council for Educational Research (2002). The list included: critical thinking, written communication, problem solving, oral communication, independent learning, ethical practice, information literacy, teamwork, and information and communication technology literacy (ICT).

Results of the study indicated that academics were influenced in their teaching and assessment by personal expectations or views. They were more likely to teach and emphasise attributes such as critical thinking, problem solving and written communication and were less likely to emphasise less traditional attributes such as teamwork, information literacy and ICT even though these are highly valued by employers and industry. Oral communication, ethical practice and independent learning fell in the middle. Differences existed between disciplines, and demographic factors played a role as well. Willingness and confidence were the key predictors of whether academic staff would teach and assess particular attributes. The study acknowledges that teaching and assessing graduate attributes is complex and pedagogically sophisticated. Only a minority of academic staff excelled at it. The study will be of interest to those involved in the work of graduate attributes, especially those charged with staff recruitment, selection and professional development, allocation of institution resources, as well as the design and implementation of graduate attribute strategies or initiatives.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-b-factor-academic-beliefs-graduates-rmit-2009
2. An online survey of 1064 academic staff across the higher education sector, regardless of discipline, was conducted.
3. The project enabled the sharing of insights and experiences, and facilitated exchange between institutions regarding their graduate attributes.
4. This was facilitated through state-based workshops as well as conversations with individual pro vice-chancellors and deputy vice-chancellors.

New perspectives on service teaching: tapping into the student experience. Associate Professor Les Kirkup (2011 ALTC National Teaching Fellow)

The experience of non-physics majors in physics subject classrooms, especially laboratories, was the focus of this study. Associate Professor Kirkup attended classes, lectures and lab sessions in order to absorb the experiences as a student might. The fellowship's findings included a negative association with physics labs and prompted the development of a whole-lab curriculum for laboratory teaching. This template is intended to overhaul the curriculum for physics instruction and is being disseminated nationally via refereed and non-refereed papers as well as through presentations at a number of institutions both in Australia and internationally.

Data was collected from sitting in on lectures and class sessions, including lab sessions as well as through interviews and surveys. Lecture content was collected with permission and was included in the formation of the template.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-new-perspectives-student-teaching-uts-2009
2. This fellowship was conducted primarily as a case study intended to enhance student-learning experiences and engagement with a first year physics subject course.
3. A framework for service teaching enhancement with emphasis on laboratory experiences was communicated through workshops, national gatherings of the physics community at UniServe conferences and the Australian Institute of Physics (AIP) Congress as well as invitations to present at various institutions.
4. A map of associations between first year physics and second and third year science subjects was developed and presented at seminars and UTS Teaching and Learning forums.
5. The first year subject course studied was significantly re-evaluated and revitalised as a good practice example.

Paramedic education: developing depth through networks and evidence-based research (DS7-616) (2007)

The paramedic profession is uniquely placed in Australia because of the industry's monopoly employer status. This study facilitated the creation of the Paramedics Australasia Academic Network. It also revealed some deep-seated tensions between expectations of academics and industry representatives about the nature of paramedic education and the road-readiness of graduates. Besides the issue of road-readiness, the other major issue identified by this study was the need for a specific paramedic pedagogy.

The study gathered data, conducting interviews with paramedic educators in the United Kingdom, New Zealand and Canada, engaging in focus group interviews with key academics, industry leaders and paramedic unions in all states in Australia, and reviewing relevant literature.

The question of whether paramedics should be taught a skills-based education or given a more broadly based health provider education is one that creates friction between employers and academic institutions. This study aimed to bring some consensus and shared goals between them.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-paramedic-education-flinders-2009
2. This project attempts to delineate best practice for pre-hospital health service providers by examining international and national models of collaboration, working relationships between ambulance service providers, professional associations and institutions
3. Future educational needs of paramedic graduates in Australia were examined in light of these relationships, as well as through the research literature
4. Interviews, focus groups, and a literature review outline current issues.
5. A major outcome of this study is the formation of the Paramedics Australasia Academic Network.

Raising the profile of diagnostic, formative and summative e-assessments: providing e-assessment design principles and disciplinary examples for higher education academic staff. Professor Geoffrey Crisp (2009 ALTC National Teaching Fellow)

While the use of technology in teaching is widespread, questions exist about the overuse of multiple-choice questions in assessments. Professor Crisp, in his first ALTC fellowship, examined the possibilities surrounding e-assessments and questions that require a more thoughtful and constructed response on the part of the student rather than a selected response such as multiple-choice which does not compel the use of complex scenarios or sentence construction.

The primary outcome of this fellowship was the creation of a website that provides instructors with aids to facilitate the creation of a variety of e-assessments.
The tools available to instructors include java applets, virtual reality (VR), and interactive spread sheets. These are all available with minimal training required on the part of the instructor.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-raising-profile-eassessments-crisp-adelaide-2008
2. Professor Crisp developed a website of e-assessment tools for teachers to improve the relationship between constructed responses and assessment online. This discipline-specific examples of interactive e-assessments can be found at the website created as part of the fellowship at http://www.transformingassessment.com
3. Use of java applets, QuickTime VR and interactive spreadsheets was encouraged as tools academics can use with minimal training.
4. The fellowship also developed the use of mobile phones by students to provide feedback in a way that is more convenient and less time-consuming than the “clicker” form of personal response.
5. Fellowship outcomes were disseminated via a number of presentations and workshops, as well as meetings with international experts in teaching, learning and assessment.

Research skill development: questions of curriculum and pedagogy (GI7-635) (2007)

The question about whether academics have an employable skill set has been with us for a while. Formally, discussion has been on the record in the UK and Australia since the 1980s about the employability of postgraduates of the higher education system. This project outlines what the skill set is through research that delineates the skills developed in postgraduate level education. The primary research questions of the project are: "what skills are being developed?" and "how are these skills being developed?" These questions are answered through a literature review, qualitative interviews with research subjects, and critical reflection on the results of the research.

This project explores the skills that postgraduate students acquire while pursuing their education. Some of the skills emphasised in postgraduate work, such as communication and supervision are directly translatable into employable attributes. However the study finds that authentic learning in the form of internships or similar types of opportunities can give students the experience that employers are looking for. This study also recommends that institutions provide educational opportunities for potential employers of their postgraduates about the skills their postgraduates are expected to have at graduation. Miscommunication or lack of information can mean that employers are not aware of some of the extensively honed skills that postgraduate students hold which would be very useful in the workplace.

Over the course of this project, the methodology was changed due to information gathering in the first phase of the study that indicated which survey-based research would not be the most effective way of discovering the skills held by postgraduates; rather, qualitative, interview-style research was substituted with good results in terms of data collection. Further research and dissemination of information is recommended.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-research-skill-development-questions-anu-2009
2. A website presenting higher degree research (HDR) skill development in a variety of institutions was developed at http://www.gradskills.anu.edu.au/
3. Identification of requisite skills for HDR candidature was the initial purpose of this study.
4. The study involved an extensive literature review as well as a site mapping the websites of the institutions and related institutions for information related to skill enhancement of HDR candidates
5. A theoretical understanding of HDR skills was achieved.

Science for early childhood teacher education students (ECTES): collaboration between teacher educators, scientists and engineers (CG8-724) (2008)

This project's primary deliverable is a full-colour resource book with accompanying CD called *Planting the Seeds of Science: a flexible, integrated and engaging resource for teachers of 3 to 8 year olds.* The book has five science modules based on the themes of the environment, day and night, forensic science, cleanliness, and solar energy. These modules were trialed in a science education unit.

The book, as a curriculum resource and teacher education aid, was developed to address a limited science content knowledge, and poor confidence and attitudes among early childhood teacher education students (ECTES). It was found that across the science education unit the ECTES increased their science teaching abilities. They displayed better attitudes towards science and an enhanced science content knowledge. These improvements were attributed towards a combination of elements: being shown how to teach science; active participation in workshops; access to resources (both the resource book and the included academic explanation of the science/engineering behind the lessons); and increased science content knowledge.

The modules were developed as part of a flexible, adaptive, and integrated curriculum with a list of resources, ideas for assessment, background science information, suggestions for curriculum integration and connections to both the 'Early Years Learning Framework and the Australian Curriculum: Science'.

Notes:

1. The ALTC resource page for this project can be accessed from: http://www.altc.edu.au/resource-final-report-2010.
2. The book can be accessed on the ALTC website: http://seedsofscience.altc.edu.au.
3. Collaboration between teacher educators and science/engineering academics was fostered in order to develop early childhood teacher education students' (ECTES) professional capacities as effective teachers of science.
4. A model of institutional interdisciplinary collaboration was developed, based on the theoretical concepts of social capital, structural holes, and social brokers.
5. This model highlighted the importance of institutional strategic support, team selection, a mechanism to shift perspective, and characteristics of the social broker (passion, vision, wisdom, legitimate authority, nurturing capacity, flexible/emergent role, and active for the entire project).

Student assessment for learning in and after courses. Professor David Boud (2007 ALTC Senior Fellow)

The utility of student assessments is to promote learned and beneficial behaviours. Ideally, this would include a culture of self-assessment and an ongoing capacity of students to repeat those beneficial behaviours in the future. This fellowship sought to examine the nature of student assessments, both during and after coursework.

It included a review of international research on student assessment, and linked that research to current practice in Australia. The methodology of the study included:

- An international and national team of expert collaborators identifying key evidence-based ideas and practices;
- Selected groups of institution teachers and managers working with these ideas and practices in order to identify potential initiatives for implementation in Australia; and
- Collaboratively identifying strategies to bring about national and institutional change in assessment practices.

Representatives of all Australian institutions were involved in different parts of the process.

The project provided seven propositions for assessment reform in higher education. The document is available on the project website listed below.

Notes:

1. The ALTC resource page for this project can be found at: http://www.altc.edu.au/resource-student-assessment-learning-and-after-courses-uts-2010.
2. Substantive deliverables from this study were a website including resource sets for those operating a subject, program and institutional levels www.assessmentfutures.com.
3. Events were conducted in almost all states and territories involving teaching staff and institutional leaders to raise awareness of current assessment issues.
4. An agreed-upon set of propositions to guide assessment reform in Australian higher education institutions for the next decade was produced.

The role of honours in contemporary Australian higher education (GI7-634) (2007)

This project engaged stakeholders at Australian institutions to determine what defines an honours program and how it benefits those engaged with it. The findings were that there is a lack of consistency among the various curricula.

This project funded the research and writing of a report, scoping the state of the honours program in contemporary Australian higher education. It attempted to locate and interview both students and staff to determine whether the honours designation has any concrete and discrete meaning. It found that honours programs provide a pathway between three tiers of higher education, and are made up of a range of requirements that have developed to suit the needs of faculty, students and staff. The honours designation has a positive cachet in Australia but is under-publicised internationally. It is possible that the honours designation, which has been traditionally a pathway between undergraduate and PhD work will be devalued if Australia should adopt the Bologna framework, as happened in Scotland.

The variability in the present curricula presents a problem for students, faculty and employers in that there is no consistent set of qualifications that each can refer to in order to communicate the status or worth of the degree. In addition, Australia should have clear delineation about what the honours degree is internationally.

The report maps the present state of the conversation surrounding the honours degree, and it calls for a reopening of the debate about the nature of this qualification.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-role-honours-contemporary-anu-2009
2. The project found that:
    a. The honours designation is continually evolving based on what happens in undergraduate and postgraduate contexts, as well as changes in the professional and multidisciplinary spheres.
    b. Different models exist for the honours designation, some embedded within the other degree and some as an add-on year.
    c. An honours degree implies both a way of learning, and an intellectual sophistication.
    d. Participants in the study agree that three core components should be met for any honours program: advanced disciplinary knowledge, research training, and a substantial independent research thesis/project.
    e. Students and conveners see the complexity and variation in current honours programs as a positive aspect, but at some organisational and institutional levels it is seen as a negative aspect.
    f. Australia faces an acute challenge of maintaining the profile of the Australian honours degree at an international level.

Work-integrated learning (WIL): a national framework for initiatives to support best practice (GI7-632) (2007)

Work-integrated learning (WIL) is a community-based learning opportunity for students to learn in a workplace environment. This form of knowledge acquisition gives students employable skills and bolsters their work experience résumé, but also forms strong bonds between the institution and the employers within the community. Good community relations provide opportunities for students once they graduate and contribute to ongoing research opportunities for the institution.

This study is the largest of its kind in Australia to date, with 35 institutions and over 600 participants contributing over the eight months of data collection. Participants demonstrated positive community relationships as well as a range of issues and challenges as the WIL program moves forward.

WIL does not describe one specific methodology for curriculum design around work-based experience, but rather delineates a range of experiences and opportunities that all provide a structured learning opportunity within a work-place setting.

The WIL study provides information on a large group of stakeholders including:

- institutions,
- institution faculty and staff,
- students,
- employers,
- professional associations and
- government.

Stakeholders expressed a desire to see industry-wide standards associated with work-integrated learning experiences. Work-integrated learning fosters strong community relations whilst providing students with authentic learning experiences in the workplace, increases their employability after graduation, and encourages community and citizenship.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-wil-work-integrated-learning-griffith-2009.
2. This project found that:
    a. Educational benefits from WIL translate into transferable graduate attributes.
    b. Business and higher education engage in a partnership to identify, promote, teach, assess and report employability skills.
    c. WIL promotes the development of work-ready graduates.
    d. Employers see WIL as a valuable recruitment tool for experienced employees.
    e. Students value obtaining “wicked work experience” and the chance to “try out” their chosen profession to see if they like it.

Engineering and related technology

Engineering science and practice: alignment and synergies in curriculum innovation. Professor Ian Cameron (2006 ALTC Senior Fellow)

Professor Ian Cameron examines the nature of learning and teaching in engineering education. His fellowship focuses on the nexus of theory and practice as well as curriculum design, taking into account pedagogic considerations and the places and spaces in which learning takes place. Active learning in the form of project and problem-based learning, project-centred curriculum, and peer teaching models have all been documented and emphasised.

Networks within Australia as well as in the international engineering community have been identified, strengthened and initiated. The focus of this fellowship is on engineering education but is translatable to many different disciplines. Opportunities exist for application to other disciplines, institutions, and professional bodies.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-engineering-science-practice-cameron-2009
2. This fellowship:
    a. examined a national and international program to identify current and future trends in engineering practice;
    b. mapped the practice areas of modern engineering in ways that illuminate key features and intrinsic characteristics; and
    c. provided a comprehensive documented resource for curriculum and course development.

Health

Curriculum development and assessment of methods to enhance communication and life skills in veterinary students (PP7-340) (2007)

Communication is a skill necessary to most professions, and central to successful veterinary practice. The development of communication abilities is a crucial component of veterinary curricula. This study found that communication skills have been identified as lacking in the veterinary students' education and yet central to success professionally.

The use of simulated client scenarios increased confidence in communication abilities for 75–79 per cent of final year students between 2008 and 2009. Differences existed between male and female students in terms of confidence in expressing empathy. For that reason, this study recommends that communication training starts early in the educational experience in order to provide students with as much practice as possible.

Various criteria such as age, institution, nationality and location of childhood development affect the expression of the human-animal bond and perception of animal sentience. Gender differences were identified in other areas such as certain aspects of client consultation: confidence to handle multiple problems; clients' perceptions of practitioner competence; and conflict in clients' attitudes to euthanasia.

E-portfolios were a component of this study. The benefit of using e-portfolios to develop communications skills was showcased as a result of this project.

Communications skills are invaluable in most disciplines and the findings produced in this study can easily be applied to other areas.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/project-curriculum-development-assessment-murdoch-2007
2. The project website is located at: http://www.tlc.murdoch.edu.au/project/ecals/
3. A specific module was developed and is available on the Bayer Animal Health website at https://www.veterinarycommunication.org/homepage.php
4. Communication skills are identified by graduates of veterinary science as lacking in their education and crucial to their success in veterinary practice
5. This study developed clinical consultations using simulated client scenarios as part of an emerging veterinary curriculum
6. Experiential tasks were found to help first year students identify the importance of communication in their career
7. Client simulations were effectively scaffolded into the curriculum at various levels
8. The study demonstrated a successful method for training students to recognise, acknowledge and support the human-animal bond in client consultations.

Ensuring quality graduates of pharmacology (DS7-621) (2007)

This scoping study had two main goals. It aimed to conduct a national survey of pharmacology teaching, including consultations with major stakeholders; and the establishment of an Australian Pharmacology and Therapeutics Education Network (APTEN).

Twenty-one institutions took part in the survey with 75 per cent completion rate. The survey revealed pharmacology as both a stand-alone subject in science degrees as well as part of an increasing number of integrated professional degree curricula. For all of the programs, lectures and tutorials comprise the bulk of the teaching supported by practicals and computer-aided learning.

Student responses to the surveys indicated that they found the discipline to be intellectually stimulating and relevant to their professional aspirations, as well as integrated with their other studies. Students preferred practicals and tutorials to self-directed learning and computer simulations.

Financial challenges in many communities mean that course offerings and management practices are frequently going through restructuring. This benchmarking study of pharmacology identified those areas of pharmacology that need to be maintained in integrated curricula to ensure the continued integrity of hte discipline.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-pharmacology-graduates-melbourne-2010.
2. Traditional teaching methods, lectures and tutorials remain the main methods of delivery in all courses with practical classes being retained by many science courses.
3. Newer methods of teaching such as computer-based instruction and problem-based learning are used less frequently.
4. Students indicated a preference for practicals over computer learning.
5. The main form of assessment at the end of a unit of study is a combined multiple-choice question and short answer/essay examination.
6. Peer- and self-assessment are used infrequently in most degree programs.
7. Student resources and communication are provided through web-based platforms which students found effective.
8. The main form of course evaluation remains the institution-driven quality of teaching surveys.
9. The role of workshops in creating a broader forum for discussion was identified.
10. Further engagement with stakeholders is best achieved by negotiation with deans and/or heads of school.

Facilitating the integration of evidence-based practice into speech pathology criteria: a scoping study to examine the congruence between academic curricula and work based needs (DS7-611) (2007)

Evidence-based practice (EBP) is endorsed by many health professionals, among them speech pathologists, and the faculty and teaching staff. However, many fail to incorporate EBP into their practice, according to this study. As EBP is part of the underpinnings of the curriculum, this project undertook to discover the disparity between word and action among educators and practitioners, and then originate recommendations for change that would encourage increased use of EBP among both existing practitioners and future graduates.

The key recommendations developed as part of this study include: changing competency-based occupational standards; developing a national plan of action for EBP curricula and resources; and creating knowledge transfer strategies for organisations and individuals. The project team recommends changing EBP curriculum at the organisational level, and also at the individual level by changing the discourse between clinical educators and students so that EBP is consistently, meaningfully considered when making clinical decisions.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-facilitating-integration-sydney-2009
2. Current national teaching practices in speech pathology and the strengths, gaps and challenges of incorporating EBP into academic and clinical curricula are reported.

Learning and teaching for interprofessional practice in health (GI7-637) (2007)

The 'Learning and Teaching for Interprofessional Practice' (L-TIPP) project was undertaken to promote interprofessional activity in the health sciences. A capacity-building model was developed in which members of the project worked with the field both interactively and collaboratively to scope the current situation in interprofessional education, practice and learning both in the institutions and in the health system. Interprofessional education takes place when two or more professions learn from, with and about each other, to improve collaboration along with the quality of care.

Outcomes of this study included a widely disseminated consultation document (available from the resources page below) that scoped the current situation in the area of study and proposed a set of strategies. They include: outlining a way forward; the creation of a major website titled Australian Interprofessionals Practice Network with a network of practitioners eager to go further with the proposal; and a document called *Interprofessional Health Education in Australia: The Way Forward.* It identifies the following four areas of development:

- Informing and providing resources for the development of curriculum
- Embedding IPP as a core component of standard professional practice in the health field as well as in registration and accreditation processes
- Establishing and implementing a research program to support and inform development, and
- Establishing a knowledge management system for the field

The project has also tapped into burgeoning international networks with major groups in Europe and North America.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-learning-teaching-health-uts-2009
2. The Australian Interprofessional Practice Network website is: http://www.aippen.net/
3. This study has initiated the development of interprofessional learning in health agencies and institutions on national and international levels.
4. Targeted proposals include informing and resourcing curriculum development for IPP; embedding IPP as a core component of health professional practice standards in registration and accreditation processes; and the establishment of a knowledge management system.

Mapping the future of occupational therapy education in the 21st century: review and analysis of existing Australian competency standards for entry-level occupational therapists and their impact on occupational therapy curricula across Australia (DS7-614) (2007)

This study entailed a discipline-specific scoping investigation to determine future directions, practice and scholarship in the field of occupational therapy (OT). The field of OT, like many applied health fields, negotiates between national and international competency standards, localised registration requirements, cross-disciplinary research domains and diverse contexts for clinical practice. All of this makes for difficulty in the formation of a coherent, comprehensive curriculum.

In addition, the curriculum in use was based upon standards at least a decade old. The Australia and New Zealand Council of Occupational Therapy Educators (ANZCOTE) had raised the concern that revised standards need to be implemented.

This report evaluates the OT Competency Standards against national and international standards to determine their utility, relevance, appropriateness and currency. It also determines the nature of required revisions. This scoping study engages stakeholders, and serves as the starting point from which future curricula can be drawn.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-mapping-future-occupational-therapy-uq-2009
2. Stakeholder feedback was collected from an online survey and focus groups and analysed.
3. The state of the occupational therapy discipline was examined to provide the basis for future directions, scholarship, and practice within OT university education.
4. A comprehensive literature review was undertaken to benchmark the OT Competency Standards with contemporary standards of practice.
5. Recommendations were produced surrounding the need for and debate concerning standards and accreditation.

Meeting the challenges of clinical exercise science and practice: a collaborative university-industry approach to align the education of the AAESS-accredited exercise physiologist with the challenges of its recent admittance into allied health (DS7-612) (2007)

The inclusion in 2006 of accredited exercise physiologists (AEP) into the domain of allied health allowed those suffering from chronic diseases to claim rebates for services administered by physiologists. This change was celebrated by the Australian Association for Exercise and Sports Science (AAESS). However, it also brought about the need for an overhaul of the existing curriculum. The existing educational guidelines for the AEP were set up for the treatment of healthy individuals and athletes rather than for diseased or unhealthy individuals. The project team undertook an ambitious endeavour to attempt to develop guidelines for curriculum renewal in a 12-month period. While this was a large undertaking, most of the objectives were met. The objectives of the study were to:

- Benchmark the existing training and education of AEP against established allied health professionals, as well against those of the American College of Sports Medicine, the world's largest association of university-trained professionals
- Scope the shortfall in curriculum and clinical placements sector-wide
- Develop a new set of knowledge and competency accreditation criteria and put together a proposal for their adoption by the AAESS for the accreditation of practitioners for Medicare
- Align existing courses with the new accreditation system
- Design a new set of clinical practice guidelines

The project outcomes included the adoption of new clinical placement arrangements, as well as the adoption of the new accreditation criteria and system for the AEP by the AAESS with an unanimous vote. As a direct result of this project, networking now exists between the profession, institutions and industry. The national president of AAESS recognised the national and international impact of this project with a letter of appreciation.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-clinical-exercise-science-vu-2008
2. The Australian accredited exercise physiologist (AEP) program of education and training is compared to other allied health professionals and to similar professionals in the American College of Sports Medicine.
3. Curriculum was examined in light of new applications of treatment to individuals in ill-health.
4. Accreditation criteria were developed and adopted by AAESS.
5. An outcome of this project is unprecedented collegiality between schools from the 27 institutions that provide courses and programs in this discipline.

Quality indicators for best practice approaches to experiential placements in pharmacy programs (DS6-608) (2006)

Pharmacy is a discipline that has an ageing workforce and client demographic requiring quality care. An integral component of pharmacy instruction is experiential learning in a work placement. This type of learning is qualitatively different from one student to the next depending on personality, supervisor and workplace differences. This study was undertaken to identify and document current practice for experiential learning and placements in Australian university pharmacy school programs. This research attempts to map experiential placements including learning objectives, teaching and learning activities and assessment processes, to showcase successful programs and identify areas needing improvement. It also seeks to develop a set of quality indicators for best practice experiential placements.

Experiential placements in many disciplines introduce students to entry level competencies, with an assessment period occurring prior to graduation or within a pre-registration or internship year. Most placements are not suitable for first year students as a specific level of skills is required during internship. However, allied health professionals are developing graduated descriptors for novice, intermediate and entry levels to provide students explicit feedback during placements.

A repository of laboratory experiments for the chemistry discipline was created and it demonstrates an innovative planning process that clearly links goals with learning processes and assessment. It also provides collaborative experience as academics, peers and students work together to trial the experiments in the repository.

Experiential placements are a key learning process for pharmacy students, and reflection on the part of the student, and supervisor's feedback, are key elements in the learning process. Graduates develop professionally and acquire key skills when they engage in authentic learning experiences under the care of a mentor/supervisor.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-experiential-placements-in-pharmacy-unisa-2008
2. Experiential placements are an important part of the pharmacy course, according to all stakeholders.
3. They are significant in developing skills, knowledge and attributes in the workplace.
4. The study reveals good practice models for student reflections and communications but notes a need for further development.
5. Increased student numbers necessitate recruitment, retention and training of preceptors.
6. The study recommends: a national repository of experiential placement learning and teaching assessment tasks; standardised developmental descriptors regarding novice and advanced beginner stages; and further collaborative work with stakeholders.

Safeguarding Australians: mapping the strengths, challenges and gaps toward sustainable improvements in learning outcomes from diverse modes of OHS education (DS7-622) (2007)

The primary and sweeping aim of 'Safeguarding Australians' was to facilitate alignment of occupational health and safety (OHS) education with changing workforce expectations. An evolving employment situation due to social and financial changes as well as change in OHS practice has meant that expectations about qualifications have changed as well. Current issues in OHS education include:

- Lack of consensus on a core body of knowledge for OHS;
- Lack of agreement regarding the level of education required for an OHS professional;
- The effectiveness of current teaching strategies in preparing OHS professionals for the business environment;
- Appropriateness of external modes of delivery of OHS programs;
- Availability of qualified OHS educators; and
- Preparation of OHS professionals to be lifelong learners.

The study included a literature review and was geared toward engaging with OHS professional, regulator, educator, registered training organisation and graduate stakeholders. It involved examining current programs and their underpinnings, eliciting stakeholder expectations of learning outcomes and determining requirements for generalist OHS professional competency.

At an ALTC OHS Educators' Workshop, participants established the Academy of OHS Education and Research.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-safeguarding-australians-mapping-strengths-challenges-and-gaps-toward-sustainable-improveme
2. Three graduate outcomes were identified in this study:
    - Undergraduate tertiary education must be recognised as the entry-level qualification for generalist OHS professionals;
    - OHS undergraduate education programs need a multidisciplinary base; and
    - A work-integrated learning (WIL) model of education needs to underpin the curriculum design process in order for the curriculum to relate to students' real-world work environments.

Health and education

Developing agentic professionals through practice-based pedagogies. Professor Stephen Billett (2009 ALTC National Teaching Fellow)

In the current climate within institutions of higher education worldwide, work-integrated learning is promoted because graduates need to be effective practitioners of their profession before they enter the workforce.

In the course of this fellowship, five studies were conducted across four disciplines (physiotherapy, midwifery, nursing and human services) in three institutions (Griffith, Monash and Flinders). A key concept in the course of the study was the production of agentic learners—learners who are not just products of the system but who display the capacity to be independent practitioners and intentional learners. The key activities included:

- Integrating practice-based experiences in response to discipline specific teaching and learning issues, including developing students' capacities as agentic learners;
- Enacting and appraising selected approaches that aimed at promoting students' independent learning;
- Evaluating the outcomes of these interventions and their applicability to other disciplines in each institution; and
- Identifying how the approaches deployed within these institutions can be replicated across the higher education sector.

Developing agentic qualities among students was found to be most effective with: adequate preparation before participating in practice settings; the support of their peers through forums; learning about the value of agency through practice and peer-based processes; and opportunities to share, reflect, and critically appraise their experiences.

Other outcomes of the fellowship involved: the trial of staff development processes called non-directive guidance; the extension of these practices within the participating teaching areas; publication in books and journal articles; and the dissemination of the findings to Australian and international academic audiences.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-developing-agentic-professionals-griffith-2009
2. The fellowship found that:
    a. preparation of students prior to practice settings enables them to most effectively participate and learn;
    b. processes to heighten awareness about the capacities required to be agentic are central to effective practice and learning;
    c. peer and other forms of support during their participation in practice are helpful for developing professional understandings, procedures and dispositions required for effective practice; and
    d. practice-based experiences enable students to share, reflect, and critically appraise their experience. These are central to developing students' professional capacities and to maximise learning.
3. The fellowship trailed a process of staff development termed non-directive guidance with some success.

Information technology

Improving the formative and summative assessment of novice computer programmers (PP6-48) (2006)

Computer programming is a crucial component of multiple industries in the 21st century, and retention rates in the computer programming discipline in Australian institutions are not encouraging. This study implicates the teaching style, which is grading-intensive and decontextualised, for low student engagement and dropout rates. Curriculum redesign and an examination of current and potential pedagogy is an important part of revamping this important discipline.

Assessment styles in current programs are out of context and end of semester exams are grading-intensive with the ability of the instructor to finish on time being the deciding factor, rather than student learning styles. Limited feedback is another issue that students face when struggling with staying focused on programming projects.

An outcome of this project was the development of two tools designed to improve both formative and summative experience of students learning to program. The first, Reflect, was originally created at The University of Sydney and provides a framework for students to self-assess their programming skills. A Reflect add-on for the Moodle learning management system was developed during the course of this study. The other tool, called ELP, was developed at Queensland University of Technology and provides online programming exercises that can be both manually and semi-automatically assessed. As part of this project, ELP was re-structured using open-source web 2.0 toolkits, making it completely web-based and usable on mobile devices like the iPhone. This portability is very important in maintaining engagement of students who have limited time to spend in a lab.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-final-report-improving-formative-and-summative-2010
2. The ELP page can be accessed from: http://www.elp.fit.qut.edu.au/
3. The Reflect system, created as an add-on for the Moodle LMS as part of this project, passed acceptance tests successfully.
4. Usability is based on large-scale testing of the student user interface and has demonstrated user friendliness and ease of use compared to the initial version of Reflect.
5. The ELP system was trialed and used in several institutions (QUT, QUT International, USQ and Brisbane School of Distance Education) by over 2000 students.
6. The ELP team plans to release ELP on an open-source hosting site in order to enable the community to both benefit and contribute towards future developments. ELP code is entirely open source.
7. The ELP system is in active use every semester and further development is planned.

Managing educational change in the ICT discipline at tertiary education level (DS6-600) (2006)

Information and communications technology (ICT) is a field in which things change quickly in order to adapt to technological advancements. This scoping study identifies ICT stakeholders from high schools to the government. The broad range of stakeholders is an indication of how ICT permeates society at all levels. The study also identifies challenges and makes recommendations for tertiary education in ICT.

Key challenges facing the discipline include: the need for qualified individuals and the shortfall due to lowering enrolment in ICT higher education. Misinformation regarding the state of employment prospects has meant that fewer high school students plan on entering this field. The Australian Council of Deans of ICT (ACDICT) was formed to provide an unified body to address these issues.

Surveys of ICT graduates indicated that they felt technically prepared by their degree; however, they wished they had received more training in workplace experience, problem-solving skills and the ability to work on a team successfully. A significantly large number volunteered the information that they would have benefited from some form of work-integrated learning experience in their degree program. This project found that the discipline needs to make a special effort to be gender inclusive.

This study makes a number of recommendations for ACDICT to establish and maintain relationships with industry leaders and teaching staff at both high school and tertiary levels in order to research and promote student recruitment and retention in the ICT field.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-managing-educational-change-ict-discipline-uow-2009
2. ICT permeates other disciplines, society, work practices and industry at all levels
3. This broad range of stakeholders requires a flexible, dynamic and responsive high school and university curriculum in order to respond to a range of demands.
4. This study engaged stakeholders, including academic staff, professional groups, and attendees at conferences, recent graduates and employers.

Management and commerce

Business as usual? A collaborative and inclusive investigation of the existing resources, strengths, gaps and challenges to be addressed for sustainability in teaching and learning in Australian university business faculties (DS6-604) (2006)

This study seeks to examine the problems, issues and opportunities within business education in Australia. It consists of a scoping project conducted over 12 months by the Australian Business Deans Council Teaching and Learning Network (ABDC T&L Network).

A scoping study seeks to understand the current situation within a discipline and often reveals areas where further work would be useful or pertinent. It can illuminate inconsistencies as well as strengths. This particular study resulted in a set of recommendations being made to strengthen the quality of business teaching in higher education. The recommendations, or proposals, are followed by directives indicating how they might best be achieved. The three funding proposals are:

- Building professionally-relevant learning and industry engagement in the business curriculum
- Building and assessing the development of generic skills across the business curriculum
- Valuing quality teaching in business education.

These three generic recommendations encompass gaps in the business curriculum that are common to many disciplines: providing authentic learning experience for students, maintaining standards pertaining to a basic or core set of skills, and rewarding good teaching. This report outlines a way forward to achieve those goals by utilising resources such as the ABDC and T&L network and the ALTC.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-business-as-usual-sustainability-sydney-2008
2. Problems, issues and opportunities facing business education in Australia are examined.
3. Report includes a literature review, interviews, and focus groups with representative stakeholders from academic, professional and industry representatives as well as students.
4. This project developed these follow-on proposals: Engaging industry: embedding professionally relevant learning in the business curriculum (PP8-928) and Beyond numbers: valuing quality teaching in business education (CG8-752).
5. Formation of a national reference group to support sustainable industry engagement is recommended to maintain excellence in business education.

Natural and physical sciences

Extending teaching and learning initiatives in the cross-disciplinary field of biotechnology (DS6-601) (2006)

Biotechnology is a young field, and one that is inherently interdisciplinary and international in scope. To extend teaching and learning in biotechnology, strong networks are required both between disciplines in the academy as well as links with industry and commercial ventures. Effective teaching and learning in the institution depends upon growth, scientific and technical change, and international competition, in order to stay current.

In order for graduates to succeed in their field, programs need to nurture relationships within the biotechnology industry where students can acquire industry experience and find job placement when they graduate.

The field of biotechnology faces considerable challenges, most notably the difficulty of founding and maintaining a small, interdisciplinary department in bureaucratic, discipline-driven institutions.

Unlike engineering, medicine or chemistry, there is no professional oversight of biotechnology education. Moving forward, the discipline needs a strong professional identity, complete with oversight like the National Qualifications Authority of Ireland that oversees all tertiary degrees and it has oversight of the National Framework of Qualifications. The discipline also needs to develop an internship program to provide graduates with authentic learning experiences in the profit-driven industry of biotechnology.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-extending-teaching-biotechnology-uq-2008
2. Gaps and opportunities for biotechnology teaching and learning were identified.
3. Pathways to enhance the quality of the curriculum in biotechnology and biotechnology-related programs were discovered.
4. The project found the key factors affecting teaching and learning in the field include: growth; scientific and technological change; international competition in the biotechnology sector; relationships between programs and industry; the inherently interdisciplinary nature of biotechnology degree programs within discipline-based institutions and scientific communities; pressures and opportunities within the institution for improving teaching in areas such as graduate attribute development; and the challenge of running a biotechnology department in a traditional, bureaucratic university environment.
5. A biotechnology education committee was established as a result of this study, in collaboration with AusBiotech, the peak professional body in Australia. This committee will serve to further the project's aims and findings.

Forging new directions in physics education in Australian universities (DS6-607) (2006)

This project examines three areas of concern identified in the previous study, 'Learning Outcomes and Curriculum Development in Physics'.

Surveys were administered to examine students' expectations and experiences within a service subject. An issue brought to light by the survey responses is the need to re-examine the laboratory experience of students in service subjects.

Undergraduate experimentation accounts for a third or more of contact time for students, has the highest staff to student ratio of any teaching or learning activity and is therefore the most expensive. It has great potential for student learning but often falls short. This study seeks to investigate effective undergraduate laboratory learning environments and to engage the academic community in coming up with sustainable research-based teaching practices. These goals were met with the identification and use of the advancing chemistry by enhancing learning in the laboratory (ACELL) method, adapted for use in physics, and the establishment of a repository of second and third year experiments.

A survey was also given to both physics graduates and employers to identify graduate destinations and employer expectations. In that light, the study explored the suitability of current course learning outcomes, content, structure and learning activities.

Dissemination of project outcomes occurred at five national workshops. Outcomes of the workshops included consolidation and extension of the established network of physics educators as well as extensive networking with the Australian Council of the Deans of Science (ACDS) and the ACELL project groups.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-forging-new-directions-physics-uts-2009
2. The project website can be accessed at: http://www.physics.usyd.edu.au/super/ALTC/
3. "Advancing chemistry by enhancing learning in the laboratory" (ACELL), adapted for use in physics, was trialed. The ACELL website can be found at: http://www.asell.org/
4. This project sought to improve networks by strengthening traditional partnerships and creating new and productive alliances.
5. Models of service teaching were classified along with their characteristic features.
6. A survey was administered and analysed probing students' expectations and experiences of a service subject.
7. Sustainable research-based teaching methods were developed with community engagement.
8. Profiles of physics graduates were compiled and published on the project website.

Mathematics for 21st century engineering students (DS6-602) (2006)

Diversification and changing high school requirements have meant that more and more engineering students are entering their university career with widely varying levels of mathematical competence. While a degree in engineering used to be equated with a high level of mathematical ability and training, that has now changed as the degree has diversified. Now, a small percentage of engineering students has the highly specialised knowledge of mathematics that is assumed of all of them. This study has attempted to scope the level of mathematical abilities of students, to map a pathway for the minor stream of Bachelor of Engineering (BE) graduates who have a highly specialised mathematical ability and to model future collaboration between mathematics educators and other disciplines. Recommendations include more reference to engineering examples in mathematics units and more cross-disciplinary cooperation between mathematics educators and the members of complementary fields such as the biological sciences and teacher education.

Crucial factors for success include: a coordinated national attempt to engage students and the establishment of a baseline competency. The use of mathematical software is useful in this regard as it gives scope for centralised development of teaching materials. The study also found that additional remedial courses and drop-in tutorial sessions have also been helpful, as has been the use of computer-aided assessment to determine individual competencies in large classes.

With consensus that mathematics needs to remain an integral part of the training of engineers, this study has focused on providing standards in terms of mathematical preparedness and the inclusion of engineering content in mathematics courses to engage students who may not otherwise be as competent with mathematics.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-mathematics-education-engineering-students-melbourne-2008
2. This scoping study conducted an examination of the linkages between mathematics and engineering educators and found that:
    a. Incoming students have variable levels of mathematical competence;
    b. Time allocated to mathematics in engineering courses has been reduced;
    c. It is increasingly difficult for employers to recruit graduates with confident abilities in mathematics, especially statistical modelling and risk analysis; and
    d. A significant number of entering students require various forms of support, and staff reductions make this challenging.
3. Recommendations include taking steps to prevent increasing variability in mathematical competence in engineering students, provide professional support to students, and creating a pathway for the production of a subset of students highly qualified in mathematics.

Physclips: multi-level, multi-media resources for teaching first-year university physics (CG6-20) (2006)

Physclips is a multi-media learning tool that is appropriate to late high school or early university students, as well as teachers or professors looking resources on elementary physics. A restructure of the high school physics syllabus has meant that first year university students have a need to acquire information quickly and efficiently. Physclips is interactive, with narration that can be paused and restarted; the lessons are self-paced and take into account cognitive load theory. Previous work (Einstein Light) by the same authors won a Science and Technology Web Award from *Scientific American* and received very favourable reviews in the journals *Science*, *American Scientist*, *Education World*, and in several newspapers: *The Sunday Times*, *USA Today* and *The Sydney Morning Herald*.

Currently, available topics include mechanics, waves and sound, electricity and magnetism. Light will be included as additional topic during 2011 and 2012. The modules are user-friendly, quick to load and easy to navigate. Videos contained in the modules require a flash player and there are no fees associated with use of Physclips because of its license under the Creative Commons (http://creativecommons.org/).

Interactive modules such as Physclips provide educators a source of engaging materials to bring first year university students up to speed on required topics. The digital tools are appealing to students who are comfortable with web-based products and services, and make the learning curve less steep for those who, due to course and requirement restructuring, did not receive sufficient high school instruction.

Notes:

1. The ALTC resources page for this website can be found at: http://www.altc.edu.au/project-physclips-multilevel-multimedia-unsw-2006
2. Physclips can be found at http://www.physclips.unsw.edu.au
3. Physclips is a collaboration between an IT specialist and a physicist.
4. Deliverables included a set of multimedia learning and teaching materials for teaching introductory physics
5. During testing in the 2006–07 school year, the website received an average of 30,000 hits per day.
6. Teachers can download teaching objects from the website for use in the lessons.

Teaching physics using virtual reality (CG7-454) (2007)

Simulation software used to create virtual reality games is useful in an educational setting because it can introduce complex topics to introductory students in a way that is hands-on, interactive and fun. Assessment following the use of virtual reality resulted in higher scores on the portions of the material that were covered in the virtual reality activities. The virtual reality components helped the self-professed learners to illustrate topics that were harder for them to grasp when communicated through the traditional means of mathematical formulas or graphs.

A key component of the success of this endeavour is the interactive nature of the software being used by the students. More so than with a simple illustrative demonstration of the topic being taught, the interactive game software made the topic accessible, understandable and less intimidating to introductory students.

The recommendations produced by this study are: that higher education institutions embrace the possibilities presented by the software and use it as an aid to teaching; that more courses integrate the software; and that further curriculum ideas are developed based on this software.

The funding for this project was used to develop a simulation of a relativistic world called "Real Time Relativity". Around this was created a teaching package including a laboratory manual, background materials, and evaluation instruments. It was then used in the process of teaching over 300 students. Evaluation following the use of the software showed an increase in scores on the parts of the assessment dealing with the concepts presented in the “Real Time Relativity” simulation.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/project-teaching-physics-using-virtual-reality-anu-2007
2. Project resources pages: http://www.anu.edu.au/Physics/vrproject/ and http://realtimerelativity.org/
3. The simulation and support materials for “Real Time Relativity” include background materials, evaluation instruments and a laboratory manual.
4. Lessons learned from the relativity project were applied to development of a prototype simulation for quantum mechanics called “QSim”
5. A randomised, blind trial demonstrated better performance on exams by students who had used the resource, and a better attitude towards the topic as well as more confidence in their ability to understand the topic.

The virtual slidebox—a new learning paradigm for exploring the microscopic world (CG7-467) (2007)

Virtual microscopy is an innovative new look at the nano-world of microscopy. It appeals to digitally engaged students and takes the crucial study of things at the microscopic level away from traditional light microscopes and into the realm of online tools. For educators at a tertiary level concerned about whether their students will be willing to learn the skills necessary to use the sometimes tedious traditional microscopes, virtual microscopy is an option.

Histology, the study of tissues at a cellular level, is a crucial and core part of any pre-medical undergraduate instruction. It is an image-intensive discipline designed to familiarise students with tissues and cells both healthy and pathological, and is crucial to understanding the progression of disease. Virtual microscopy (VM) has a place in any classroom where microscopic images are used.

VM reduces costs for departments that would otherwise be dependent on the availability of light microscopes, increases collaboration and cross-disciplinary discussion, with the flexibility of an online tool. It promotes interaction between educators and private practice and has a broad appeal to a diverse student base.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-virtual-slidebox-uq-2010
2. The Virtual Microscopy Catalogue can be accessed from http://www.dentistry.uq.edu.au/virtual-microscopy-catalogue
3. New media technologies such as VM are reshaping the production of knowledge, and enabling more interaction between the sciences and arts based disciplines.
4. Aperio Technologies' Spectrum software was used in the production of the database where the VM slides are stored along with metadata.
5. This database is located on a server at the UQ Centre for Clinical Research.
6. In students' surveys, feedback has been unremittingly positive (over 80 per cent for all survey years agreed with the statement: "Using the virtual microscope positively enhanced my learning of the material in this course").

Virtual microscopy for enhancing learning and teaching (CG7-398) (2007)

The virtual microscopy project provides interactive virtual slides to students in the sciences, particularly human anatomy (histology), human pathology (histopathology), comparative anatomy/zoology and plant ecology/evolution. A barrier to learning using microscopic images for many students has been an inability to properly master the use of a microscope. Providing them with interactive, virtual slides available online via username and password has produced positive feedback as well as statistically significant increases in student assessments. The University of New South Wales (UNSW) is the one of the first school outside of North America to provide virtual microscopy as learning and teaching aids to its faculty and students. The tool received positive student feedback. The scope of the project is broadened with the goal of ongoing dissemination. Further grant proposals are being made to ALTC as part of this.

Virtual microscopy provides material that can be used across disciplines and therefore promotes multi-disciplinary learning and collaboration. The slides themselves are produced using very high resolution scans which can then be manipulated by the user in order to zoom in or out, click and drag, and adjust the apparent illumination of the object displayed. These features simulate the use of an actual microscope while eliminating the learning curve that disadvantages some students in their study.

The collection of high-quality, peer-reviewed images resides on a protected server maintained by the Faculty of Medicine, UNSW.

Notes:

1. The ALTC project resources page can be accessed from http://www.altc.edu.au/resource-virtual-microscopy-enhancing-unsw-2009.
2. The virtual microscopy page can be accessed from http://virtualslides.unsw.edu.au/.
3. The availability of slides of tissues from a broad range of species and environments enabled teaching about adaptation and diversification.
4. Mean ratings from students were above four on a scale of one to five for effectiveness, quality of images, ease of use and capacity for promoting discussion; over 80 per cent of students described the virtual slides as “fun,” almost 90 per cent rated them as better than traditional microscopy.
5. Use of the virtual slides resulted in a statistically significant improvement in student assessments compared to traditional practice; these results are being submitted to a journal for publication.
6. The Curriculum Corporation in Melbourne has requested to host the virtual slides; the Curriculum Corporation is a partnership of all Australian Education Ministers, they will make the slides available free of charge to all Australian and New Zealand schools.
7. A vision-impaired student, who otherwise would have been unable to enrol, was able because of the availability of the virtual slides, to take the first year BIOS1101 (Evolutionary and Functional Biology) at UNSW.

Non-disciplinary

Closing the gap in curriculum development leadership (LE6-5) (2006)

Policy change concerning middle-level curriculum leaders, recognition for those leaders and the design of staff development materials and opportunities for them was the aim of this study. The project leveraged on internal and external funding opportunities to secure a resource base for the teams and individuals who were mentored.

Over the course of the project the team and others developed an integrated staff development program targeting their leadership capabilities for curriculum development and management. They also fostered changes to institution staff policies and procedures in order to ensure recognition, appropriate remuneration and resourcing of middle-level academic leaders. The project team provided a set of incentives for members of the targeted cohort to participate in this program through leveraging off internal grant opportunities. Findings and skills were disseminated at: various mentoring and support programs; participation in ALTC, HERDSA, and other public symposia; and offsite projects at La Trobe University, The University of Melbourne, Curtin University, and the University of the Sunshine Coast. The key evaluation measure was embedded locally and nationally through a hub-and-spokes model as well as external involvements. A lengthy academic paper was prepared and submitted for publication.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-closing-gap-curriculum-development-leadership-uq-2010
2. This project:
    a. developed a staff development program focusing on leadership capabilities for curriculum development;
    b. produced funding and resourcing as well as recognition for middle level academic leaders;
    c. provided incentives for participation to members of the targeted cohort; and
    d. disseminated findings through mentoring and support programs, participation in public symposia, and especially through involvement in offsite projects at other institutions.

Engaging with learning: understanding the impacts of practice-based learning exchange (CG7-397) (2007)

Practice-based learning exchange (PBLE) is defined as engaged learning activities though which students work collaboratively with partners in public, community or industry sectors. This can be, but is not limited to, industry and community-based placements and internships.

Research findings are highly complimentary to PBLE, indicating that these exchanges are the most powerful and highly valued learning experience reported by students and alumni who participated in PBLE during their time in university. Positive outcomes are: greater engagement with discipline-specific knowledge, development of higher-order generic skills, creation of good professional relationships and enhanced graduate employability. There are also significant benefits to the institution and host organisations. Practice-based learning experiences can:

- generate reflective learning and knowledge exchange between staff and students of the institution and the participating organizations;
- contribute to community and subject-area knowledge though the specific projects undertaken by students;
- facilitate reciprocal relationships between host organizations and the institution that extend beyond the PBLE to other areas; and
- realise the potential of institutions to be effectively engaged in their communities.

Poorly implemented PBLEs can be quite negative, generating tension rather than cooperation between host organisations and institutions. It is imperative that care be taken in the following three areas:

- Designing the PBLE—poor design can lead to negative student experiences and self-esteem, and setbacks in university-community relations.
- Institutional support—current status of PBLE is low despite its value by students and alumni. Institutions need to get behind practice-based learning experience and promote, recognise, encourage and support sharing and curriculum design of PBLEs.
- Relationships with hosts—the competition for positions places high demands on potential host organisations. Institutions need to centralise coordination of placements and involve hosts in the curriculum design, assessment activities and research partnerships.

Practice-based learning experiences are highly valued learning opportunities for students and give much needed experience in job situations before graduates enter the employment market. Institutions need to devote resources and time to ensuring good host-university relations and adequate support for students engaged in these important experiences.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-engaging-with-learning-melbourne-2009
2. The project aimed to discover what constituted good pedagogical practice in embedding practiced-based learning exchange in university curricula.
3. The project:
    a. examined the outcomes of PBLE for students, non-academic university partners and institutions;
    b. explored under what conditions under-effective learning exchange is likely to occur; and
    c. discovered that PBLE are the most valued and powerful learning experiences self-reported by participating students and alumni.

Enhancing the student educational experience through school-based curriculum improvement leaders (LE6-10) (2006)

The 'Curriculum Improvement Leadership Project' (CILP) was a two-year qualitative, inquiry-based study to determine the nature of curriculum improvement and student experience in school-based distributed leadership situations. The three primary goals of the project were:

- To build the leadership capacity of curriculum improvement teams through collaboration and professional development in order to effect sustainable curriculum change in alignment with university and school educational goals, as well as organisational strategic plans.
- For curriculum leaders to enact School-based projects that build upon existing initiatives with a view to developing scalable models that account for the disciplinary context;
- To work towards enhancement of students' educational experiences that effectively address their diverse and changing needs using cascading models of best practice for professional development.

The project made some progress towards the first goal in identifying the capacity of distributed and informal leadership across different schools within an institution. For some, the environment was such that they could securely develop their leadership and curriculum improvement skills. However, other situations disintegrated because of the amount of organisational restructuring that had to be done.

The schools that were able to function with distributed leadership implemented curriculum improvement projects and produced reports. Progress towards the second goal was determined by interviews. These interviews were also useful in identifying problems experienced by the curriculum improvement leaders (CILs).

The third goal was largely not reached due to a major restructuring effort of the university administration and academic groupings during the time of the study which removed both attention and resources from the project at a critical juncture. Participants who remained engaged with the project found the restructuring to be extremely upsetting and were unable to proceed with the long-term goals, which remain unmet.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-enhancing-student-educational-experience-murdoch-2008
2. The project website can be accessed from: http://www.tlc.murdoch.edu.au/project/cilp/index.html
3. Curriculum improvement leaders were selected who had the ability due to their knowledge and skills to lead sustainable curriculum change in their schools.
4. Learning and assessment activities, as well as material for students, were improved.
5. Students acquired greater flexibility of access and communication between students and staff increased.

Integration and assessment of graduate attributes in curriculum (GI7-633) (2007)

The national graduate attributes project (National GAP) examined the gap between the stated goals by Australian institutions to foster graduate attributes and the actual ability to achieve those goals. Graduate attributes are often presented as a statement of outcomes used to inform curriculum design and the provision of learning experiences at an institution. They describe core abilities and values that a community believes all its graduates should have at the completion of their studies.

This project identified a GAP framework of eight elements which affect an institution's ability to achieve the desired graduate attributes through curriculum renewal. They include:

1. Conceptions: differences in understanding affect the writing of policy, the design of curriculum and the approach to the development of graduate attributes;
2. Stakeholders: different groups have alternative stakes in the articulation and development of graduate attributes;
3. Implementation: the way an institution coordinates and approaches the implementation of its graduate attributes policy is often neglected;
4. Curriculum: curriculum planning for graduate attributes development, general curricular structure and pedagogical features influence the development of graduate attributes;
5. Assessment: the explicit embedding of graduate attributes in assessment is essential for policy implementation;
6. Quality assurance: the way the institution or discipline monitors and assures the development of graduate attributes is one of the most influential drivers of effective implementation;
7. Staff development: the way an institution enables and engages staff efforts to foster graduate attributes contributes to the success of the endeavour; and
8. Student-centred: the strategy has not worked unless it is perceived by students to have actively engaged them in developing worthwhile attributes.

This project brought together 300 members of academia over three rounds of symposia. At these events, 90 collaborative expressions of interest were generated. An international network of linkages continues to develop even though the GAP project is now complete.

Notes:

1. The ALTC resources page for this project is located at: http://www.altc.edu.au/project-integration-assessment-graduate-sydney-2007
2. A video on the role of graduate attributes in emerging institutional QA processes can be found at http://www.itl.usyd.edu.au/projects/nationalgap/resources/videos.htm
3. A database of statements is available at http://www.itl.usyd.edu.au/projects/nationalgap/resources/gamap/introduction.htm
4. The project developed a series of short issues papers on each of the framework elements, available online at: http://www.itl.usyd.edu.au/projects/nationalgap/resources/discussionpapers.htm

The seamless integration of Web3D technologies with university curricula to engage the changing student cohort (CG7-488) (2007)

More and more students are turning to distance education now that it is widely available. Distance education has many benefits, but also specific drawbacks, one of which is that interactions are limited and instruction relies heavily on text. A text-based instruction can be limiting for some students. The increasing availability of web technologies to support academic concepts is attractive as a means of improving the provision of distance education in particular. Virtual worlds (simulation software) available over the Internet can improve educational opportunities by increasing student collaboration and interaction while presenting material in a way familiar to students who have grown up with gaming.

Limitations on using virtual worlds to present educational material are the familiarity of the faculty with the available technology, the computing capabilities required to host a highly interactive web-based platform and the evolving nature of the software itself.

As education becomes increasingly reliant on technology, particularly for distance learners, curriculum that takes advantage of the digital environment and the familiarity that many younger students feel with using such technologies can only enhance the educational experiences of tertiary students. Departments that can take advantage of these digital tools will be able to engage their student body in multiple ways that step away from a single-aspect reliance on text as a means of communication, and will be able to offer many of the collaborative experiences that face-to-face learners have been able to take advantage of in the classroom.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-integration-web3d-university-curricula-usq-2010
2. The project page can be found at: http://web3dexchange.org/joomla/
3. A national community of practice has been developed for supporting academics wishing to work with 3D virtual worlds.
4. The project found that Web3D technologies require significant equipment commitment for high-speed data transfer; and that most systems are not yet ready for routine application by non-technical end users.

Society and culture

Developing an integrated national curriculum for the education of the social work and human services workforce (DS7-627) (2007)

Demographic factors in Australia mean that social work and human services are one of the fastest growing sectors of the workforce. This study found that while this field is in a period of expansion, there are not enough qualified practitioners to replace the ageing workforce which is near retirement. It also revealed that remuneration is not sufficient to attract enough new practitioners into the field.

Educational qualifications for individuals going in to social work and human services are too diverse for the highly specialised practitioners that are required in this workforce. The findings in this report clearly indicate a need to re-examine the qualifying education for students wishing to work in this field.

Analysis based on this study revealed a lack of co-ordination between educational institutions and VET (vocational educational and training), as well as a lack of uniform accreditation nationally. This lack of cohesion among training programs, coupled with economic disincentives to enter the field means that unless something is done there will be a shortage of individuals qualified to perform these services. This report makes a number of recommendations for how to redesign and renew curriculum in the field of human services and social work:

- Identify accredited social work and human services courses as a national education priority (similar to education and nursing);
- VET and higher education providers are encouraged to collaboratively develop educational directives for students wishing to achieve higher qualifications, so that these pathways are accessible and clear;
- DEEWR (Department of Education, Employment and Workplace Relations) ought to analyse a national workforce and planning process along with other stakeholders; and
- Develop a national regulation framework for the social and community services workforce. National standardised certifications or qualifications provide clarity in the workforce but also bolster public confidence in the sector.

The information provided in this report touches on a deep dissonance in a field of increasing and ongoing relevance in Australian society. Continued monitoring of this much needed restructuring is recommended.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-social-work-human-services-uq-2010

Forward thinking: teaching and learning philosophy in Australia (DS7-620) (2007)

The goal of this study was to record the state of tertiary teaching of philosophy in Australia, as well as to provide benchmarking data on philosophy in the areas of teaching academics, the structure and composition of the philosophy major, and teaching from the initial year of philosophy instruction at the tertiary level up to and including the honours year and postgraduate study. It was also a goal of the project to build networks amongst those desiring to enhance their teaching practice and engaging in curriculum renewal.

An accessible, centrally located database was created which can be used by department heads, program conveners, and others in the planning of their own departments. The database contains information regarding teaching and learning philosophy in Australia at all levels. It also identifies challenges facing the discipline over the next decades.

The study makes three recommendations to the Australasian Association of Philosophy (AAP):

- That the AAP discusses this report with heads of philosophy programs
- That the AAP facilitates information sharing on best pedagogical practices at their annual conference and disseminates the information on their website
- That the AAP establishes discipline-specific graduate attributes in cooperation with other interested or involved bodies.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-forward-thinking-teaching-philosophy-flinders-2010
2. An online database was created for use in curriculum design, accessible at: http://www.aap.org.au/forwardthinking
3. This study benchmarks the state of philosophy education at a tertiary level in Australia
4. The network of philosophy academics with an interest in teaching and learning has been extended as a result of this project

Future-proofing the creative arts in higher education: scoping for quality in tertiary creative arts learning, teaching, and research training (DS7-624) (2007)

The aims and objectives of this scoping study were to compile some evidence-based research on the professional doctorate programs in the arts, primarily visual arts in Australia and, in a limited capacity, abroad. It also aimed to identify models of thesis submission for the PhD and the professional doctorate as well as to gain both a national and international understanding of quality research methods. This research provided the basis for compiling recommendations for ongoing cross-institutional and cross-sector collaboration in designing and developing creative arts doctoral studies. A project website would then disseminate findings and liaise with stakeholders and key institutions http://www.creativeartsphd.com/.

This study is key interest to academics in the field of creative arts both in Australia, and international academics in the visual arts and other creative arts disciplines.

Recommendations arising from this scoping study are:

- A community of practice communication network for postgraduate coordinators should be established.
- Postgraduate coordinator meetings be organised at the annual Australian Council of University Art and Design Schools (ACUADS) conferences
- An ACUADS or ALTC led symposium on supervision practices in the art and design sector be convened
- Further investigation into the benefits and costs of structured research training components through either expanded coursework or research methods programs be conducted
- A database of exemplar theses like the one in the UK: http://www3.shu.ac.uk/c3ri/adit/index.cfm be created
- The merits of various approaches to examination be further investigated.
- An international network of peers be established.

This research could also conceivably be extended to other creative arts disciplines with the involvement of key groups, institutions or the combined forces of colleagues across the related disciplines.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-future-proofing-creative-arts-melbourne-2009
2. This study provides evidence-based understanding of doctoral studies in the creative arts.
3. It describes models of thesis submission for the PhD and identifies quality research training, establishing benchmarks for standards of creative arts doctoral supervision, research training, examination and outcomes.
4. Variability among the levels of supervisory experience among supervisors was identified as a key issue, along with diverse examination models, and differences between course availability and expectations.
5. Further investigation into the benefits and costs of structured research training components through coursework is recommended.

Historical thinking in higher education (DS7-626) (2007)

This study was built upon the research and curriculum reviews performed by the Australian Historical Association (AHA) between 1998 and 2007. It is the first tertiary-level study of both staff and students focusing on the nature, development and purposes of historical education. The findings of this study were illuminating.

University students in their first and third years from 11 institutions throughout Australia were surveyed, along with 50 academic staff. Despite the wide geographic range of the survey responses they had a surprising amount of consistency. The students associated historical thinking with a general connection between past and present, and an imperative to avoid repeating mistakes of the past. They also associated historical thinking with reading books, journal articles and other secondary materials. In contrast, the academic staff in their survey responses stressed the understanding and interpretation of primary historical materials.

Student views were also interesting in that they discounted the role of technology and browsing and considered traditional reading of print resources to be more important. An important finding of this study was a lack of differentiation between responses from first year and third year tertiary students.

This study provides a basis for further work on collaborative design, testing, and appraisal of programs and assessment standards.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-historical-thinking-higher-education-macquarie-2009
2. Differences were found in the articulation of historical thinking between history students and teaching staff.
3. Students expressed historical thinking as a general connection between past and present, whereas staff stressed the application of research skills to primary evidence.
4. This divergence provides an opportunity for sector-wide revision of the curriculum in terms of task design and the articulation of standards of achievement.

Innovation with quality assurance: online curriculum development for the University of New England's multi-institutional collaborative programs in German at UNE, James Cook and Newcastle universities (CG6-34) (2006)

Multilingual abilities have always been an important facet of tertiary education, but while that has stayed the same, declining budgets have reduced language programs offered, and faculty and teaching staff at many institutions. Face-time language acquisition has become a limited commodity. At the same time, many institutions are increasing their online course offerings. The Deans of Arts, Social Sciences, and Humanities (DASSH) recognised the need to maintain diversity in language offerings in Australia. It has commissioned a project aimed at addressing national understanding of collaborative models of teaching appropriate for both language courses and other small-enrolment disciplines.

This project developed materials to deliver German instruction via online resources. It was revealed during the study that much support was needed for students using the resources, as many younger students did not tend to use them as often as more mature students. This may have a connection to a more autonomous learning style among mature students versus a more teacher-oriented learning style among younger students. The cohort of students engaged in this study revealed a need for strategies to encourage younger students to become autonomous learners.

A deliverable of the project is the web-based curriculum *Deutsch e-rklärt* (German e-xplained). It was developed to address students' use of learning tools in order to acquire language autonomously. It utilises distance education technologies to deliver introductory German curriculum with pedagogy and learning strategies embedded in the material. The curriculum consists of 15 modules, each with 11–13 components, and utilises vodcasts (video podcasts) and audio graphics software. This multimedia learning can be accessed via desktop computer, mobile phone or laptop either by way of RSS feed or by iTunes subscription. Its platform is viewable on either a computer interface or a mobile device, and most components can also be used on an mp3 player such as an iPod. This multi-device flexibility is a big advantage for delivering online materials. The program has been showcased at conferences for secondary and tertiary language educators, and development of further levels of German instruction are in the works. The program could be adapted for other languages.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/Innovation%20with%20quality%20assurance%20-%20UNE-%202009
2. The website created for this project can be found at: http://tlc.une.edu.au/deutsch-erklaert/
3. This project:
    a. evaluated and developed new technologies for web-based language curriculum;
    b. disseminated the curriculum to all German teaching academics in Australia and then internationally;
    c. disseminated information regarding the design and concepts underpinning the curriculum;
    d. communicated with stakeholders; and
    e. investigated a language model that could maintain and increase the number of language programs available to students nationally.

Sociology in Australia: a scoping study (DS7-623) (2007)

This scoping study seeks to outline the state of sociology within Australian higher education. The study of sociology exists as a stand-alone discipline but also as a facet of many other fields of study. Some of the more popular course offerings are: methodology; health, medicine and the body; deviance, social control and criminology; and feminism, gender and sexuality.

The study finds that the field of sociology is not well advertised. In comparison to the better documented American discipline of sociology, the Australian field finds itself existing under a number of different names, variations among course titles and not very visible amongst the offerings at many institutions. The study recommends that there be a focus on branding sociology within institutions as well as promoting the field outside of the institution.

Sociology has a key role in terms of interdisciplinary application. Many other subject areas require coursework in sociological areas. Interdisciplinary contact offers opportunities for expansion, as does its application in vocational areas in terms of research methodology.

The study recommends that departments of sociology work on branding their offerings, emphasising the interdisciplinary nature of their studies and the importance of the research skills taught at the undergraduate level.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-teaching-sociology-australia-rmit-2009
2. This project found that:
    a. Sociology is relevant in many disciplines and in the vast majority of institutions.
    b. Subjects falling under the sociology banner include: methodology; health, medicine and the body; deviance, social control and criminology; and feminism, gender and sexuality.
    c. The discipline is not well advertised, and is characterised by theoretical disputes, subject matter fragmentation, and some disagreement over moral or political affiliations.
    d. Sociology is challenging to teach. Some of the challenges include cost cutting; the invisibility of sociology in restructured institutions; balancing teaching and research; class size; and workload.

Sustainable and evidence-based learning and teaching approaches to the undergraduate psychology curriculum. Associate Professor Jacquelye Cranney (2006 ALTC Associate Fellow)

Associate Professor Cranney strengthened the work of the Australian Psychology Educators Network (APEN) by getting APEN formally recognised by Australian Psychological Society (APS), and promoting increased dialogue regarding evidence-based learning and the role of teaching and learning in the discipline.

A significant outcome of this fellowship is a set of nationally recognised graduate attributes (GAs) for the undergraduate degree of psychology. Recommendations were developed for strengthening the teaching of undergraduate psychology in order to ensure graduates attain the set of nationally recognised attributes. This fellowship recommended a set of graduate attributes which has now been incorporated into the Australian Psychology Accreditation Council's (APAC) Rules and Standards (APAC, 2008; http://www.apac.psychology.org.au/).

Notes:

1. Dr. Cranney's fellowship page can be found at: http://www.altc.edu.au/altc-associate-fellow-jacquelyn-cranney
2. The fellowship has set up a webpage on the APS website for psychology educators to network and share resources http://www.groups.psychology.org.au/tlpig/.
3. This fellowship project addressed issues identified by another scoping study in psychology: Designing a diverse, future-orientated vision for undergraduate psychology in Australia (DS6-603).
4. The fellowship sought to facilitate national adoption of sustainable and evidence-based teaching and learning approaches to undergraduate curriculum.
5. The fellowship establishes a process for selecting and sharing teaching and learning materials associated explicitly with student learning outcomes.
6. This fellowship explicitly promotes the adoption of evidence-based teaching and learning strategies in psychology.

The nature and roles of arts degrees in contemporary society (DS6-609) (2006)

This study mapped the state of the Bachelor of Arts (BA) degree in arts education between 2001 and 2008. It produced a set of outcomes regarding the BA curriculum and what a degree in the arts means.

The scoping study had the following outcomes:

- Creation of a definition of arts programs to promote consistency
- Identification of the key features of an arts program to further articulate the value of a BA degree
- Development of models to describe curricula currently in use
- Development of an arts program database that can be used sector-wide
- Testing of a national communications strategy across arts programs to allow the dissemination of findings across the sector
- Development of a methodology for studies of areas identified as requiring further investigation

A crucial outcome of this study was the creation of the arts program database. This database is centrally located and is accessible across the sector to facilitate future development. It is a key tool that can be used by institutions for quality assurance programs such as preparing for audits and curriculum reviews. The database contains such information objects as program profiles, case studies, data sets and highlight or summary reports. They can all be accessed via the Australasian Council of Deans of Arts, Social Sciences and Humanities (DASSH) website at http://www.dassh.edu.au.

Notes:

1. The ALTC resources page for this project can be found at: http://www.altc.edu.au/resource-nature-and-roles-of-arts-degrees-flinders-2008
2. The arts program database can be accessed via http://www.dassh.edu.au.
3. This scoping study identifies the strengths, difficulties, capabilities and contributions to the community of the Bachelor of Arts (BA) degree
4. It considers the BA degree in light of changing situations nationally and internationally
5. It seeks to understand the place of an arts degree in contemporary Australia
6. This project led to the creation of a definition of an arts program, an identification of its key features, the development of models to describe current curriculum choices, the development of an arts program database, the testing of a national communication strategy across arts programs, and the development of a methodology for further studies.

Uncovering Theology: the depth, reach, and utility of Australian theological education (DS7-610) (2007)

Uncovering Theology, the report written as a result of this project by Dr Charles Sherlock is a portrait of Australian tertiary theological education. This report is the end result of a study that explores the current state of theological education in Australia and provides a scope of where further study would be useful. *Uncovering Theology* also encourages international relationships among the various theological organisations in Australia and around the world: The Carnegie Foundation for the Advancement of Teaching (Clergy Study), The Association of Theological Schools in the United States and Canada (ATS), and the UK Higher Education Academy (Subject Centre for Philosophical and Religious Studies) (PRS).

This project identified several areas where further study would be useful. These include:

- developing a common structure for a first degree in theology
- developing sector-wide standards for graduate attributes, learning outcomes, and evaluation instruments
- training for faculty in teaching and research methods and supervision
- obtaining sector-wide information regarding research and teaching strengths.

The study encourages collaboration and cooperation among guiding bodies in Australian theological education as well as the nurturing of relationships in the international theological community. It calls for common standards in terms of theological tertiary curriculum and student supervision, and seeks to inform both government and educational institutions about the role of theological education in Australia.

Notes:

1. The ALTC Resources Page for this project can be found at: http://www.altc.edu.au/resource-uncovering-theology-acu-2009.
2. The details for the book published as a result of this project are as follows: Title: Uncovering theology: the depth, reach and utility of Australian theological education Author: Charles Sherlock. Publisher: AFT Press. Year: 2009.
3. *Uncovering Theology* can be downloaded from [Book (ISBN 9781921511806)3.94 MB].
4. The data collected during the course of the project are published in Appendix G in the book.
5. This study brings together a large quantity of knowledge about the various colleges and churches engaged in Australian theological education.
6. It fills an identified lack of understanding about policy and practice in diverse colleges or institutions.
7. A significant outcome was the creation of a database of information regarding Australian theological institutions.
8. The study uncovers a long-established, academically robust and distinctive dimension of higher education in Australian theological education.

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