

UniServe Science Conference 2005 Abstracts (Oral presentations only)

9:15 am – 10:15 am	
<p>Keynote: Professor Peter Goodyear, Centre for Research on Computer Supported Learning and Cognition (CoCo), The University of Sydney</p> <p><i>Blended learning: design and improvisation</i></p> <p>'Blended learning' is a term that has come to mean 'appropriate combinations of face-to-face and technology-mediated learning'. Peter will address the practical question of how best to help teachers in higher education identify and integrate appropriate combinations of learning activity, with and without technology support. He draws on research from the fields of student learning, ergonomics, architecture, teachers' thinking and educational design to identify some likely candidate solutions. His presentation will offer a perspective on educational design as a real-world activity and will introduce 'design patterns' as ways of capturing and sharing educational design experience.</p>	
10:45 am – 11:10 am	
EALT	<p>Alex Merchant and Ken McGregor</p> <p><i>Reflections on using student-authored questions to encourage learning in Physics</i></p> <p>In our previous work we outlined preliminary studies into the effectiveness of a teaching method designed to encourage students to pose their own questions as an assignment task. While the questions posed by students provide considerable feedback there were two main criticisms of the work: was the dialogue between students on a level where they were discussing true and accurate science; and was the technique practical for large classes. In this paper we provide a further analysis of the student discussions and how they relate to the questions posed, moreover how they relate to the objectives of the course. We will also discuss approaches to validation of the student discussions through self-moderation and propose a model for implementing this technique at different year levels.</p>
Room 311	<p>G.K. Ellem and E.A. McLaughlin</p> <p><i>Tales from the coalface: From tragedy to triumph in a blended learning approach to the teaching of 1st year biology</i></p> <p>In 2004 we made a significant move to blended course delivery in 1st year Biology at the University of Newcastle. Innovations included electronic delivery of course notes, laboratory instructions and other support material including interactive templates, instructional & background videos, step by step guides for data analysis and two on-line laboratories. Students also submitted reports electronically and used email together with peer review to provide guided feedback to each other. Online discussion boards were used to interact both with and between students to assist outside of class times. Continuous assessment entailed the use of automatically marked online short answer quizzes.</p> <p>Feedback on the implementation of a blended learning approach in Semester 1 both during and after the completion of the semester showed that, although grades were strong, student and staff satisfaction levels were the lowest on record. Key issues identified were workload, quality and quantity of feedback and perceived collusion. In the light of this feedback changes were made to course delivery in Semester 2 to reduce workload, improve feedback and minimise collusion. At the conclusion of Semester 2 overall course grades and the results of student surveys showed that grades and satisfaction were the highest on record. All this with a 40% reduction in part time teaching costs for Semester 2. We believe that our experience demonstrates that a blended learning environment can produce an improved quality learning experience at reduced cost BUT, only when that environment is matched with skilled, experienced and motivated teaching staff.</p>
Room 312	<p>Michael Bulmer, Valda Miller, Helen Byers, David Milne and Mia O'Brien</p> <p><i>The Impact of Classroom Design on Collaborative Learning</i></p> <p>The University of Queensland has recently opened a purpose-built space for collaborative learning. The aim of the work presented here was to trial the use of this space for a course in statistics for science students. For this trial the students worked in several groups of 15-20 students within the space. Their task over a two-hour session was to design a simple scientific study, collect appropriate data from fellow students, research necessary statistical methods, prepare a brief scientific paper of their results, and create a PowerPoint presentation to show in a mini-conference that concluded the session. This was a lot to do in two-hours, necessitating collaboration within the groups. The trial itself was studied by three educational researchers who made systematic observations of what students were doing during the sessions. Of particular interest was how the students were interacting with each other and how they were interacting with the space. The paper will present the results of these observations and discuss to what extent the collaborative learning space was effective in its design goals, both in general terms and specifically in the support of learning statistics for science.</p>
11:10 am – 11:35 am	
EALT	<p>John O'Byrne and Richard Thompson</p> <p><i>The tutorial benefits of on-line assignments: MasteringPhysics in first year physics at the University of Sydney</i></p> <p>Computer-based learning and assessment are not new concepts in university teaching. <i>MasteringPhysics</i> is a significant new internet-based 'assignment' system, that facilitates assessment, but whose real value is as a tutorial tool for students. <i>MasteringPhysics</i> guides students through problems that may require textual, numerical or symbolic input, making it valuable for many types of problem used in teaching physics. The system provides hints and adjusts its feedback in response to student answers. <i>MasteringPhysics</i> was introduced as a trial for one stream of first year physics students at the University of Sydney during the second semester of 2004. These students used traditional paper-based assignments earlier in the year, allowing us to probe student response to the two approaches using questionnaires, focus groups and mark comparisons. The on-line system worked well and was favoured by the students, but did not have a significant impact on overall student performance, at least in part because students did not integrate it effectively into their approach to learning. With this experience, we have expanded the usage of <i>MasteringPhysics</i> in 2005, aiming to develop student acceptance beyond merely seeing it as an assignment system. We see <i>MasteringPhysics</i> as a means of making 'assignments' a more effective learning tool, placing them alongside lectures, workshop tutorials and laboratories as a major method of presenting physics concepts and examples to the students.</p>

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Room 311	<p>Geoff R. MacFarlane, Kevin Markwell and Elizabeth M. Date-Huxtable <i>Encouraging students to 'think as biologists': independent field-based projects and peer assessment as a deep learning strategy</i></p> <p>Based on criteria of contextual factors that encourage a deep approach to learning, an independent field-based activity for students of behavioural ecology was created. The project was designed in such a way as to allow responsible choice in the method and content (animal species) of study; involved posing questions and problem solving; and modelled the process of conducting and publishing the results of research. Results from collection of quantitative data on students perceptions suggested that the learning context created through the activity encouraged problem solving, provided appropriate feedback, had clear aims and goals and was constructed in a fashion that allowed flexibility and responsible choice. Students' perceptions of their orientation to learning were consistent with attributes of a deep-learning approach. Students agreed that the project encouraged learning for understanding, engagement, confidence and self-efficacy, and personal growth. To address the problems of obtaining insufficient feedback during the writing of a scientific manuscript based on the project, a peer assessment component was introduced modelling the scientific publication process. Providing feedback to peers helped students critically reflect and identify the important attributes of a paper suitable for publication. Receiving written feedback from peers also allowed reflection and modification of writing and the interpretation of findings.</p>
Room 312	<p>Layna Groen and Georgina Carmody <i>Blended Learning in a First Year Mathematics Subject</i></p> <p>This paper argues that the achievement of learning objectives for a first year mathematics subject, Operations Research Modelling, can be best fostered through a blended learning design. 'Blended learning' can be used in a variety of contexts. In this paper, the definition used is that of the integration of 'traditional' learning activities - lectures, tutorials, <i>Mathematica</i> and optimisation laboratories, and paper-based assessment tasks - with learning activities and environments more usually associated with other disciplines - collaborative learning, online assessment, peer review, cases studies, spreadsheet technology, and the information and communication technology, <i>Blackboard</i>. It is argued that a blended learning design includes learning activities that more closely mirror professional practice, and is more likely to encourage a deep approach to learning. Effectiveness of the blended learning design is examined from the perspective of students and teaching staff through the analysis of responses to questionnaires and comments collected.</p>
11:35 am – 12 noon	
EALT	<p>Kate Wilson and Paula Newitt <i>Quantum Leaps in Blended Learning: an online project for physics students</i></p> <p>Blended learning is usually spoken of or written about from the point of view of the teacher: that is, provision of course materials, activities and discussion, in a mix of face to face and online environments. This paper looks at blended learning from a student perspective. Second year physics students, working in small groups, were asked to develop a website introducing some aspect of quantum physics. The task is a progression from a mini-conference in their first year in which they worked in groups to present talks and posters on topics in quantum mechanics to their peers, to using the internet as a means of communicating with a wider audience. In this study the students were required to find their own topic, again in quantum mechanics, and form their own groups to determine what would be on the web site, and how they would go about creating it. Most students did not have previous experience in web design, and group members had to attend external tutorials to gain the necessary skills. The assignment was monitored by a selection of students keeping reflective dairies, describing what they were doing throughout the time spent on the assignment and reflecting on their learning. Focus groups were also held, as well as online discussions of their progress. Students found value in the assignment well beyond the developed understanding of an area of physics. The enriching aspects of this online project included establishing a community of interest through interacting with their peers, within and between groups, fostered by seeing the web sites produced by other groups in the class. As the best web sites were to be hosted on the Department web site, the potential public accessibility of these sites motivated the students to consider the wider aspects of science communication issues. This aided the development of a feeling of community with professional practitioners including the academic staff within the department. The students felt that the web site was a way of communicating with their teachers, and communicating their own understanding of the topic not generally afforded by more traditional assessment tasks such as problem sets.</p>
Room 311	<p>Rosanne Quinnell, Elizabeth May, Mary Peat and Charlotte Taylor <i>Creating a reliable instrument to assess students' conceptions of studying Biology at a tertiary level</i></p> <p>As part of a study to assess the impact on tertiary biology students of changes to the HSC biology curriculum, we developed a questionnaire to survey student conceptions of biology. This required the creation of multiple Likert-scale items in two sub-scales: (i) fragmented conception of biology (e.g. Biology is just the study of facts); and (ii) cohesive conception of biology (e.g. Biology allows predictions to be made about everyday life and situations). Before implementing the questionnaire to address our main research questions, and because this was the first time to our knowledge that a Conceptions of Biology Questionnaire had been designed, we needed to validate its use in distinguishing between students who have different conceptions of biology as a science discipline. We used data from students in their first week of tertiary biology to analyse the reliability of the conceptions of biology items. Analysis using SPSS software indicated that items in the two conceptions sub-scales were individually reliable (Cronbach alpha values > 0.6). However, factor analysis indicated that items in the fragmented sub-scale were not being discriminated from items for cohesive concept by students. This result allowed us to reword the fragmented conception items before re-administering the questionnaire and thus improve students' ability to discriminate between fragmented and cohesive statements. We are now confident that the questionnaire will accurately discriminate students with different conceptions of biology and recommend this practice for all future such investigations.</p>

Room 312	<p>Ansie Harding, Dan Kaczynski and Leigh Wood <i>Evaluation of blended learning: analysis of qualitative data</i> When we implement changes in learning, such as blended learning, we wish to judge the impact of the reform. Evaluation is a process by which we make judgments about the worth of an educational development. The difference in learning is subtle and deep and may be unexpected by those implementing the changes. Ways to explore these deep processes in learning include interviews, observations and open-ended questionnaires targeting all concerned in the process such as students, teaching, administration and technical staff. This generates a mass of qualitative data that many are unaccustomed to analysing. This paper will discuss the process of evaluation; give examples of successful evaluation methods and show how to analyse qualitative data. We will discuss the use of the software tool NVivo to assist with the analysis. If we are to succeed with blended learning, we need to do more than implement learning changes. We need to make judgments about the worth of the reforms so that we will provide our students with the best possible outcomes</p>
12 noon – 12:25 pm	
EALT	<p>Ian Clark and Patrick James <i>Blended Learning: an approach to delivering science courses on-line</i> The past reticence of science faculty to embrace distance and on-line learning has been the perceived difficulty in delivering the practical and fieldwork aspects of a course in a meaningful way. Various methods have been employed to overcome this ranging from the preparation of practical kits that could be sent to students to the preparation of virtual field trips. Most experiences of these approaches have found them to be too expensive (both financially and in preparation time) and/or too difficult to manage. In practice it is always easier to deliver this kind of experience in a face-to-face environment. We have experimented with a variety of approaches in arriving at our present position of trying to deliver geoscience courses on-line. This paper will describe the evolution of an introductory undergraduate geoscience course from a completely face-to-face delivered course to one which can be largely taken off-campus. We have experimented with CAL modules, just-in-time teaching (Novak, Gavrin et al. 1999) mail-out practical kits, interactive field simulations using a combination of digital images and real earth materials, and virtual field trips. Our present approach is one that can be described as blended learning (Thorne 2003). Blended Learning is a theoretically sound pedagogy that involves a combination of on-line and face-to-face delivery that we have found to be the most satisfactory approach to flexible delivery of courses that contain a practical and/or field component. The paper will describe the course, give examples of the different learning materials and a summary of student evaluations of the course using the standard University of South Australia course evaluation instrument (CEI) supplemented by focus group interviews.</p>
Room 311	<p>Kathy Takayama and John Wilson <i>Mapping student learning throughout the collaborative inquiry process: the progressive e-poster</i> As 21st century research approaches in the biological sciences continue to progress at an ever-increasing pace, the need to shift the research-teaching nexus from the periphery to mainstream science education has indeed been addressed at departmental, institutional, national, and international levels. Yet, we have found that student perception of biology education remains predominantly content-centric, focused on skills acquisition in prescribed activities with little flexibility or autonomy. Whilst this may be partly attributable to their experiences in courses where pedagogies have remained stagnant in comparison to the dynamics of research, we have addressed this issue by asking ourselves whether we are indeed teaching students how to think like a scientist- that is, is the pedagogy of the discipline aligned with the practice of the discipline? In response, our approach has focused on the creation of collaborative learning communities from what we believe is a crucial starting point: 'thinking about thinking'; i.e. the enhancement of learning through individual and group reflection and analysis of the scientific inquiry process. Moreover, we have demonstrated the feasibility of such an approach in a large, second year microbiology course of 280 students. The progressive e-poster is a group assessment project that maps student learning on the process of collaborative inquiry. The e-poster project was conducted in parallel with a semester-long laboratory research project whereby students isolated a specific bacterial genus from an environmental sample. The progressive e-poster modifies a traditional mode of communication of research in the biological sciences ('the poster'). It is distinct from the traditional scientific poster in purpose, format, and assessment practice. Students worked with tutorial + lab team members to collectively reflect on their scientific approach; develop their notions of what constitutes resources and references that are a) reliable and b) relevant to each stage of the project; continually develop/revise/build upon conceptual maps of their organism, and their experimental process; identify areas of uncertainty or concern; and discuss possible ways to address these issues. The "progressive" format of this e-poster underlines the iterative model of inquiry: there were 3 submissions, and each poster progressively mapped the team's experimental and reflective process. Each team received an identical web e-poster template. Teamwork was facilitated through WebCT private discussion sections, and collective agreement was reached before the poster was submitted electronically. Our goal has been to shift student perception of the process of scientific research from the traditional "linear", outcomes-focused approach to an iterative, reflective approach that engages students in an inquiry process more cognisant of professional scientific practice. The e-poster assesses student engagement in the process of inquiry, and facilitates review and reflection throughout the course (rather than at the end). For the instructor, this assessment approach progressively mapped group learning of the experimental, conceptual, and collaborative processes. Detailed rubrics were developed to assess learning outcomes from each version of the e-poster to ensure alignment with our goals and consistency of assessment across all 22 teams. The rubrics were also distributed to the students provide transparency of process. Our observations of the changes in the nature of the course were marked by the transformation of the tutorial groups into collaborative learning communities. The co-evolution of students' intrinsic motivation with this assessment was evidenced by the richness and quality of student discussions in WebCT,</p>

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	<p>indicative of higher levels of thinking, integration of theory and practice, and a culture of peer learning and teaching. We have witnessed the natural integration of theory and concept with practical application into the context of the research project. Several teams took the initiative to create their own original concept maps to document the evolution of their conceptual schema. Evaluation of group learning processes during e-poster discussions revealed peer learning and teaching, mentorship, and cross-disciplinary thinking. The progressive e-poster provided a framework that structures the processes of transfer and application step by step, to make them "visible" to the students, and placed ownership and responsibility on the team to identify and develop solutions for areas of difficulty or uncertainty. Our outcomes from the e-poster project provide evidence-based guidelines to inform the development of: approaches to scaffold the process of scientific thinking in other disciplines; and authentic assessment approaches for collaborative inquiry-based learning. The emphasis on research-informed learning and teaching in our iterative model is relevant not only to undergraduate and postgraduate courses, but serves as a mentorship model for research supervisors.</p>
Room 312	<p>Sabita D'Souza, Leigh Wood and Peter Petocz <i>Engineering students' views of Computer Algebra Systems</i> Researchers and educators are working towards changing the content of the mathematics programs and the ways in which it is taught in order to best prepare students for the 'real world' by moving from a focus on arithmetic and computational skills towards one that develops students' abilities to reason, think and communicate mathematically. The goal is to help students build their conceptual understanding of mathematics and not just memorise facts and formulae. The teaching of mathematics at universities is likewise changing in order to meet these new goals. Instead of teaching by demonstration, a blend of instructional methodologies is recommended that include individual and group work as well as direct instruction in both face-to-face and computer-supported environments. The focus is to provide opportunities for students to explore and solve problems - individually and with others, and to develop their mathematical skills in the context of this exploration. One catalyst for change is the widespread and increasing use of computer algebra systems by professional mathematicians and in teaching and learning mathematics. In this paper, we present the results of a questionnaire concerning tertiary students' attitudes towards using computers in learning mathematics, in particular the use of Mathematica. Three hundred and forty four first-year engineering students studying a core mathematics subject from a cohort of about 436 took part in the study. They worked on collaborative group activities during their set tutorials times and computer laboratory classes for one semester. Students were evaluated on the work they produced during the tutorials and laboratory sessions. Students completed a questionnaire on their learning style preferences. The questionnaire also sought additional information regarding students' attitudes towards using computers, attitudes towards group-based assessment, and their reactions towards group-work in mathematics. Twenty students were interviewed in depth about their attitudes. Interviews were audio taped and transcribed. Several quotes from the interviews are used to illustrate the questionnaire data. Statistical analysis was performed across four demographic variables: gender, age, number of years spent in Australia and language spoken at home. The findings showed that a clear majority of both male and female students, high-school leavers and mature age students, recent immigrant and Australian residents and students from all 4 language backgrounds (English, Middle Eastern, Asian & Indian and European) who appeared to hold the view that Mathematica can be used not only as a sophisticated number cruncher but also as a useful tool that can aid in the process of understanding concepts learnt, and can make learning a more enjoyable and interesting experience. The findings also indicate that fewer students indicated that they suffered from computer anxiety as evidenced from the responses and appeared to feel positively self-confident about being able to use computers. Also, the qualitative data from the interview transcripts revealed hierarchical themes regarding the use of computers in mathematics instruction - a lower level theme where students viewed Mathematica as a sophisticated number cruncher and a second higher level theme where students were of the opinion that Mathematica not only could be used as a sophisticated number cruncher but also that using the software helped their understanding of concepts. We have shown in this study the desirable effects of using Mathematica which supports the findings of many existing research studies, but not so many of them are conducted in the engineering education domain where mathematics is taught as a service subject. So, with such promising findings, how is it that greater implementation of CAS into university mathematics courses is not apparent especially in engineering education given that the attitudes towards CAS appear to be favourable? The reasons seem to involve all players - academics, students and administrators, as this paper will discuss. This paper will also discuss the implications of these findings for course design and assessment.</p>
<p>2:10 pm – 2:45 pm</p>	
<p>Raoul A. Mulder, Mark A. Elgar and Declan Brady <i>APRES: electronically managed student feedback via peer review</i> Students maximise learning when they receive timely and detailed feedback on their performance from teachers as well as peers. Yet in many subjects taught at university level, feedback consists only of grades and written commentary from teachers, on a final version of submitted work. This form of feedback provides little incentive or opportunity for improvement and places considerable demands on staff in subjects with high enrolments. In 2004 we addressed these problems in our subject Experimental Animal Behaviour, by involving other students (peers) in the feedback process, and designing a web-based software platform – APRES – to manage the administratively complex task of exchanging submitted work and reviews between students in an anonymous context. We evaluated the success of our innovation by means of written student evaluations, changes in Quality of Teaching survey scores, and changes in the quality of submitted work. All three areas indicate that the project was highly successful. We believe that there is considerable promise for widespread application of this form of feedback and the software platform that enabled us to implement it.</p>	

2:45 pm – 3:10 pm	
EALT	<p>Will Rifkin <i>The World-Wide Day in Science as exemplar of problem-based, blended learning with international scope</i> The World-Wide Day in Science (WWDS) project has university students employing a wide range of information technologies in an example of ‘blended learning.’ The project enables problem-based learning with ‘authentic assessment’ within a single university subject and in collaboration that stretches across universities and across continents. Students engaged in this project at the University of New South Wales (UNSW) rarely meet as a whole class, although they are all frequently on campus. They do meet as teams, suffer the frustration of unanswered e-mails, lament not recording each others’ phone numbers, and grudgingly recognise the value of an online discussion board. By the same token, though, they are impressed to see their work published on the web alongside submissions by university students in Uruguay and Spain, high school students in suburban Sydney, and scientists themselves from every continent, including Antarctica.</p> <p>For the past three years, development has been under way on this global activity to reveal the day-to-day charms of scientific work to university students and their high school kin. It is a career guide assembled by students for students, thus lending credibility where our glossier university publications might fail. The World-Wide Day in Science project incorporates the drama of capturing a single day’s events around the world; the allure to students of working in print, images, and sound to tell the stories that they produce; and the scope of the world wide web as a venue for publication. University students create a website to depict a ‘day in the life of a scientist’, a particular day, this year being 15 April 2005. Student reporters from Australia, Spain, and Uruguay captured a snapshot of the world of the science in their locale by shadowing willing scientists for the day. The scheme worked in 2003 with eighty-one students at the University of New South Wales, so why not run the effort worldwide? In 2004 and 2005, student planners and team managers guided producers and reporters up to 15 April. Then, student editors and production staff slaved for the six weeks that followed to create a website. The stories and images collected were tailored to reach an audience of high school students who are exploring the possibilities of different career paths.</p> <p>This effort engages university science students in a range of ‘best practice’ learning strategies - problem-based learning, authentic assessment, and multi-media and information technologies used in a ‘blended learning’ strategy. Students enhance the graduate attributes that are in demand by employers (as well recent graduates themselves) - oral and written communication, teamwork, and managerial abilities. The ‘Day in Science’ assignment is intended make the university science curriculum more engaging for science students and high school students who are considering studying science.</p>
Room 311	No presentation in this venue
Room 312	No presentation in this venue
3:30 pm – 3:55 pm	
EALT	<p>Kankana Chakrabarty <i>Decision Analysis under uncertainty for elearning environment</i> The proposed paper represents a soft decision analysis methodology for analyzing student performance measures in case of e-learning environment. It is observed that a number of controllable and uncontrollable variables can contribute to a variety of psychological hesitation patterns in case of flexible learning, particularly while incorporating mixed mode delivery. A number of uncertainty modelling areas involving different psychological types are addressed and the notions of fuzzy logic and fuzzy IC-Bags are used as the tools for the purpose of analyzing the patterns. The concept of fuzzy logic, with its multitude of applications in the areas of artificial intelligence, can provide a strong alternative to the traditional concept of set membership where the degrees of membership of the elements play an essential role in the explanation and quantification of uncertainty. The pseudo-contradictory nature of the variables in the decision space can play an interesting role while observing the above mentioned semi-deterministic and non-crisp patterns.</p>
Room 311	<p>Julian Dermoudy, Sue Jones, Jon Osborn, Dominic Geraghty and Richard Dearden <i>nexus: journal of undergraduate science engineering and technology</i> Graduate destination survey data underscore the reality that a large proportion of students undertaking undergraduate degrees in the sciences do not enter the workforce upon graduation. Science degrees lead to further study at Honours, Masters, and PhD level. Thus undergraduate degrees in science are a foundation for research careers and should contain a greater proportion of research-oriented knowledge and practice than most other undergraduate degrees. At the University of Tasmania, a project was initiated in 2004 to emphasise this reliance upon research skills in the undergraduate curricula and to highlight the nexus that exists between teaching and research that is so critical to scientific scholarship and student development. The project is innovative as it is the first such project undertaken within Australia. This paper describes the project, which, because of its successful introduction is now an annual undertaking. The aims of the project were to provide a model and a means of consolidating, integrating, and promoting the teaching-research nexus within the undergraduate science curriculum at the University of Tasmania. The project sought to develop a model that encourages academics to incorporate learning outcomes related to information literacy, research methodology, and the effective communication of scientific research into their undergraduate units, and, to establish a journal that showcases the research undertaken by our undergraduate students. These were not simplistic aims. The University of Tasmania’s Faculty of Science, Engineering, and Technology comprises twelve disparate schools spanning the physical, numerical, life, and earth sciences, engineering, computing, architecture, and psychology. This project has successfully developed an integrated model for unifying all disciplines within the context of the journal and by modelling the professional practice of researchers and academics, provides a marketable, attractive, and credible outlet for our students’ research activity. In the paper we present the methodology developed for the embedding of the journal’s requirements within the undergraduate curricula, the novel use of mentors to aid the students in their writing, the infrastructure developed to sustain the project into the future, and insights into pitfalls and their avoidance. We</p>

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	<p>highlight the success of the project (in terms of production, relevance, representation, and self-sustainability), describe the learning outcomes engendered directly and indirectly by the project (developing students' knowledge and understanding of research activity and their skills of inquiry, analysis, critique, and authorship) and indicate critical factors for ongoing success. Finally, we present results of an evaluation of the project from the three perspectives of Editorial Committee, academic staff, and students.</p>
Room 312	<p>Alexandra Yeung, Justin Read and Siegbert Schmid <i>Students' learning styles and academic performance in first year chemistry</i> Student learning does not occur in a vacuum. Numerous factors influence student learning, some of which are beyond the control of either student or instructor. Where appropriate, design of new methods of teaching and learning should accommodate such factors. For example, use of information and communications technologies allows flexible working hours of students to be accommodated. One factor beyond the teacher's control is the students' learning styles. Learning styles are a wide variety of strategies and preferences expressed by students for how they like to learn and for what they believe helps them learn. They take into account students preferentially focusing on different types of information, and their tendency to use perceived information at different rates. There are a number of classifications of learning styles in the educational literature, e.g. the Myers-Briggs Type Indicator (MBTI) and Felder-Silverman Index of Learning Style amongst others. Previous research involving learning styles suggests that students whose learning styles are compatible with the 'teaching styles' of the course instructor tend to retain information longer and have a more positive post-course attitude. Our study starts from this suggestion and examines whether students in chemistry actually do perform differently depending on their learning styles. In order to determine the distribution of learning styles amongst our students, the Paragon of Learning Styles Inventory (PLSI), based on the four Jungian dimensions of the MBTI, was distributed to approximately 1000 first year chemistry students at the University of Sydney. We found that the distribution of learning styles amongst our students is not typical of the general population, but has a significantly higher proportion of introverts and judges compared to extroverts and feelers. More importantly we found that academic performance, both in a practical (titration) assessment and on the final exam, correlates with the strength of particular learning characteristics. Our data shows that on average, introverts performed significantly better than extroverts in the final exam, with an average difference of about ten marks between the extreme scores. Similarly, thinkers performed better than feelers with an average difference of about eight marks between the extreme scores. Since adults' learning styles tend to be stable characteristics, effective instruction must accommodate a variety of learning styles, if student learning and understanding is to be maximised. This presentation will describe these results in detail, discussing possible reasons for the difference in performance and suggesting ways to support a variety of student learning styles.</p>
3:55 pm – 4:20 pm	
EALT	<p>Barbara White and Jodi Tutty <i>What, no lectures!: Experiences from a blended tablet PC classroom</i> Wireless enabled, mobile, tablet PCs, content websites, and a learning management system have been combined in three hour face to face workshops during the past two years at Charles Darwin University to teach various subjects in a Bachelor of Information Technology program. The traditional lecture, tutorial and practical have disappeared and instead been blended together in new workshop classes where a range of online resources and facilitated learning activities allow students to interact directly with the lecturer, the content (concepts, theories and principles), and fellow students to enable a very different approach to University education where the focus is on active learning. Using a communities of practice framework, this paper will explore how learning does occur in this situation, how the use of ubiquitous technology (wireless tablet PCs) and good quality online learning resources are blended to enable successful active learning environments for students. This paper will contend that appropriately designed blended learning environments are flexible enough to cater for a range of student needs, from the most capable to students who would normally struggle in a traditional university classroom.</p>
Room 311	<p>Susan Jones, Leon Barmuta, Julian Dermoudy, Regina Magierowski, Jon Osborn, Jane Sargison, Richard Dearden, Christine Evans, David Waters <i>What do we teach and what are they learning? Evaluation and assessment of the information literacy skills of science students</i> It is generally acknowledged that the most effective learning outcomes occur when generic skills are an integral part of teaching within the discipline and taught to all students in a structured and progressive manner. The teaching of information literacy skills (ILS) therefore needs to be embedded into the curriculum, and taught with an incremental approach appropriate to the discipline. How can we determine what skills our students already possess, and at what level? And how can we best teach and assess their learning of information skills within the context of their own discipline? This project aimed to develop a tool that would allow us to test students' current knowledge and skills against the six national standards for information literacy formulated by the Australian and New Zealand Information Literacy Framework. In collaboration with staff at QUT, we developed discipline-specific survey instruments for measuring the current information literacy skills of our students. The survey has two main sections that, respectively, probe students' knowledge of information literacy and their actual approach when seeking information. For this part of the project, we focussed on three schools that we anticipated might have rather different expectations of their graduates regarding ILS: Computing, Engineering, and Zoology. Within each school, we surveyed undergraduate students in years one, two and three. Surveys were anonymous, and administered by library staff. Responses were coded (as correct/incorrect), and results analysed using logistic regression or log-linear modelling to provide comparisons across year groups and between disciplines. In the key areas of locating information (Standard 2), critical evaluation (Standard 3), and uses information with understanding (Standard 6), the survey responses demonstrated clear differences between the disciplines, but, unexpectedly, little difference between the year groups. Zoology students tended to perform better overall, which may reflect a programmed approach to teaching information literacy within that school. We also surveyed academic staff to map the explicit teaching of ILS across the Faculty. We found that current teaching appears to be addressing all six information literacy standards, but is primarily concentrated at years one and two. A significant number of units include explicit</p>

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	<p>statements regarding the teaching of information literacy in their unit outlines, in either the unit's learning objectives, its content, or its assessment. Some include statements in all three components; a significant group include statements in the description of the unit's content and assessment, but not in the unit's learning objectives. At a local level, our results will inform current work within the Faculty on developing a generic attributes curriculum. At a broader level, the survey instruments provide a tool to facilitate comparisons of students' ILS across year cohorts within institutions, or, indeed, between institutions.</p>
Room 312	<p>Justin Read, Adrian George, Anthony Masters and Michael King <i>Identifying the existence of barriers to students' learning from assessment results</i> Chemists have long believed that some students simply do not 'get' organic chemistry. This suggests that there exists a barrier to meaningful understanding of organic chemistry, and that some students do not succeed in overcoming this barrier. However, little in the way of empirical evidence has been offered to support this belief. The present study has analysed data from examination results from more than 1400 first year students across 8 different units of study, each of which covers both general / inorganic chemistry and organic chemistry. Substantial evidence has been gathered to support the existence of such barriers, and this evidence demonstrates that such barriers are absent in the general / inorganic sections of these units. A speculative interpretation of the nature of the barriers in organic chemistry will be offered. Knowledge of such barriers, and of their nature, has obvious implications for both curriculum design and teaching practice. In addition, the methods used to identify these barriers are readily applicable in other domains, and this presentation will describe how such an analysis can be conducted and interpreted.</p>
4:20 pm – 4:45 pm	
EALT	<p>Jacquelyn Cranney, Michelle Kofod, Gail Huon, Lene Jensen, Kirsty Levin, Iain McAlpine, Michele Scoufis, and Noel Whitaker <i>Portfolio Tools: Learning and Teaching Strategies to Facilitate Development of Graduate Attributes</i> The University of New South Wales (UNSW) is committed to supporting students in the development of graduate attributes through the creation of learning and teaching strategies and electronic tools. This paper describes a project designed to (a) help first year students identify, document and reflect upon career-relevant achievements in relation to graduate attributes, and (b) develop learning and teaching strategies that enable students and academics to see these activities as worthwhile within the context of specific courses and programs. In 2003, an electronic Graduate Attributes Portfolio prototype was developed to be used by students to record academic, extracurricular and employment related activities relevant to each of the UNSW graduate attributes. Following two trials with volunteer students from a range of backgrounds, the portfolio's use was embedded into a course (PSYC1021-- Introduction to Psychological Applications) within the Bachelor of Psychology specialist program, in Session 2 2004. Strategies were implemented to: assist students to become aware of their current level of achievement in each of the graduate attributes; provide structured development of specific attributes within the course; and encourage further development of these attributes prior to graduation and associated job interviews. Specifically, the strategies included: pre- and post-ratings and assessments of the students; specific graduate attribute development tasks; researching extracurricular activities; portfolio documentation and writing an application that drew upon the portfolio material for an internship in a psychological setting. The findings of our evaluation of this exercise indicated that students improved in the targeted skill areas across the course (eg average mark for experimental design increased from 41% to 63%), and our specifically designed and delivered activities assisted in their awareness of their skills, how to develop those skills, and how to utilise those skills in career advancement. That is, students responded positively to the explicit integration of strategies that assisted them in identifying and planning the development of attributes they saw as meaningful. Technical limitations in the electronic Graduate Attributes Portfolio prototype resulted in the development of word-based proformas (Portfolio templates). This initiated the development of the UNSW Student Portfolio Support website (http://www.portfolios.unsw.edu.au/default.cfm). In Session 1 2005, these new tools, integrated with focused learning and teaching strategies, are being implemented and evaluated with the new cohort of students in PSYC1021. To date, the specific outcomes of this project have been: the development of learning and teaching strategies that enable students to see the relevance of documenting and further planning the development of graduate attributes and career-related achievements; the development of a portfolio support website that will assist current and future students in these activities; and the development of teaching resources that can be implemented in assisting students develop these skills.</p>
Room 311	<p>Richard Tucker and John Rollo <i>Fair assessment and blended learning in collaborative group design projects</i> The two hundred years of the apprentice/master tradition underpinning the atelier studio system is still at the core of much present day architectural design education. Yet this tradition poses uncertainties for a large number of lecturers who, faced with changes in the funding of tertiary education, can no longer teach design as it has historically been taught. If these deficiencies remain unchecked and design-based schools are unable to implement innovative learning structures that successfully overcome resource intensive one-to-one studio teaching, then architecture may prove to be based on an unsustainable course structure. Rather than spreading their time thinly over a large number of individual projects, an increasing number of lecturers are setting group projects. This allows them to co-ordinate longer and more in-depth review sessions on a smaller number of assignment submissions. However, while the group model may aim to reflect the realities of the design process in professional practice, such an approach can severely limit the teaching of individual student skill competencies. What is needed is a readily adoptable andragogy for the teaching and assessment of group design projects that is centred on research models of group learning, and collaboration. The paper describes the background, methodology and early results of a Strategic Teaching and Learning Grant currently running at the School of Architecture and Building at Deakin University. The project builds on collaborative research between the school and a Deakin University teaching and learning support service (Deakin Learning Services) that in 2004 identified the need for additional resources to assist in group teaching. The STALG funded project is evaluating and comparing two design programs at Deakin that blend a range of group structures and collaboration scenarios, and it is envisaged that the results of the investigation may</p>

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	inform other project-based teaching disciplines experiencing a similar need for new knowledge and skill-based delivery due to increasing staff-student ratios.
Room 312	<p>Ieva Stupans and Geoffrey March <i>Use of Online delivery including Capure CAM-PRO in teaching Applied Pharmacotherapeutics courses in the Pharmacy program</i></p> <p>In the University of South Australia Pharmacy program a multistage project was undertaken which sought to identify student issues around problem solving ability. In 2004 in response to identified shortcomings, problem based learning was incorporated into Applied Pharmacotherapeutics courses. To gain an understanding of acceptance by students of this new teaching modality focus group discussions were carried out with students in these courses during 2004. The major issue which emerged from these focus groups was the student contact and private study time that the incorporation of the PBL tutorial format required. Staff teaching within the program have responded to the issue of student contact time by conversion of some lectures into a Capture Cam format. Students have been surveyed about their views of this lecture format. This paper will report on these findings and compare these to survey results about online formats in the Applied Pharmacotherapeutics courses in general. The major issue which emerges from student feedback is that students "prefer face-to-face teaching".</p>