

## An Instructional Design Course for Clinical Educators: First Iteration Design Research Reflections

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### Abstract

*This paper describes the theoretical foundations of an online course to teach clinical educators how to convert a traditional face-to-face course for either flexible or distance delivery. We describe the design research approach to the creation of the course and the pedagogical theory behind the course development. We also present the details of the research project that we will be running including the rationale for the research, the research hypothesis and the research methodology. In concluding we give a brief outline of our experience of teaching the course for the first time.*

### Keywords

*design, applied, research, instructional, flexible, distance, clinical, health*

## Project Background

The Centre for Medical & Health Sciences Education and the Learning Technology Unit at the Faculty of Medical and Health Sciences, University of Auckland are jointly offering a course – E-Learning and Clinical Education (ClinEd 711) – as part of a new clinical education degree programme. The aim of ClinEd 711 is to teach clinical educators the necessary instructional design skills to allow them to convert their traditional face to face courses for flexible/distance delivery. ClinEd 711 was offered for the first time commencing Semester 1, February 2007 as a fully online distance education course.

The research project associated with ClinEd 711 was designed to allow us to answer a number of key questions with respect to teaching educators about e-learning development. In particular we are concerned with: the preparedness of lecturers to teach with technology; the success or otherwise of ClinEd 711 in terms of teaching clinicians instructional design skills; and the factors that impact positively and negatively on the lecturers' intentions with respect to e-learning development once they have completed the course.

## Course Content and Development

ClinEd 711 was created around two key documents used by the Learning Technology Unit. The first document – Needs Analysis Document – functions to capture key information necessary to instigate a project to convert a traditional face to face course for flexible/distance delivery. This document asks for a rationale for the course conversion and elicits details concerning the current

mode of delivery and the new provisions required. This document is not intended to be exhaustive. Rather it functions to ensure that there is a clear reason for converting the course and to indicate broadly that the project is viable in terms of the development work required. Students on ClinEd 711 are expected to complete the Needs Analysis Document during the first three weeks of the course. Successful completion of the document entails that students have chosen a course or course module to develop for online delivery and that the project is feasible in the time available during the semester.

The second document – Course Development Document – details pedagogical thinking and development work required to successfully convert a course for flexible/distance delivery. Completion of this document ensures that the course is appropriately developed in terms of course content, student activities, teaching support and student interaction. In order to complete the document the lecturer would have to detail the following for each module in their course: module topic and associated learning tasks; student roles and activities; delivery mode; teaching and learning resources; tutor support role; and methods of assessment and feedback. Thus, cognitive engagement is ensured through considering learning tasks and student roles and activities; teaching presence is ensured through considering the tutor support role and the assessment and feedback mechanisms; and student interaction is ensured through considering student roles and activities and the delivery modes (Hutchins, 2003).

Students engage in a range of individual and collaborative learning tasks and progressively build up the necessary skills for completing the two course documents throughout the ten modules of ClinEd 711. An overview of the course is provided in Table 1.

*Table 1: Overview of E-Learning & Clinical Education (First iteration of the course in 2007)*

<b>Module</b>	<b>Content</b>
1. Introduction to E-learning and Clinical Education	<ul style="list-style-type: none"> <li>• Course outline and requirements</li> <li>• Student introductions</li> </ul>
2. Learning Theory	<ul style="list-style-type: none"> <li>• Teaching perspectives, principles of good practice in education, and theories of learning</li> <li>• Relevance of learning principles and theories</li> <li>• Application of learning theories to students' own courses</li> <li>• Describe and justify selection of course to be translated to electronic format (Needs Analysis Document)</li> </ul>
3. Technologies and Media	<ul style="list-style-type: none"> <li>• Technologies for e-learning</li> <li>• Media characteristics</li> <li>• Critical features of the learning space and the learning experience</li> </ul>
4. Copyright	<ul style="list-style-type: none"> <li>• Introduction to copyright laws and protocols</li> <li>• Procedures to ensure respect of copyright when creating an online course</li> </ul>
5. The Role of the Teacher	<ul style="list-style-type: none"> <li>• The teacher's contribution to online learning</li> <li>• Online discussion</li> <li>• Supporting e-learners</li> </ul>
6. Assessment	<ul style="list-style-type: none"> <li>• Assessment options for e-learning and clinical education</li> </ul>
7. Learning Objects	<ul style="list-style-type: none"> <li>• Definitions and purposes of learning objects</li> <li>• Sourcing and using learning objects</li> </ul>
8. Quality Assurance	<ul style="list-style-type: none"> <li>• Importance of quality assurance</li> </ul>

- |                                 |   |
|---------------------------------|---|
| 9. Instructional Design         | <ul style="list-style-type: none"> <li>• Methods relevant to e-learning</li> <li>• The role of instructional design in the creation of e-learning</li> </ul>                |
| 10. Course Development Document | <ul style="list-style-type: none"> <li>• Peer feedback on, and completion of, the blueprint for development of the student's chosen course in e-learning format.</li> </ul> |

The course uses the focus topic provided by each module – numbers 1 through 10 in Table 1 - to scaffold students in considering their beliefs regarding knowledge and learning in the context of their existing teaching practice and their e-learning development project. The course has been designed to progress to module ten with the expectation that students should by that time have arrived at an understanding of their own role as instructional designers with respect to the courses that they are developing. For example, students will have considered their own teaching perspectives, various teaching and learning theories, the available technologies for e-learning, and their roles as online educators. An overview of the assessment of student coursework is provided in Table 2.

*Table 2: Overview of student assessment in E-Learning & Clinical Education (First iteration of the course in 2007)*

<b>Coursework item</b>	<b>Module(s)</b>
Online group discussion around course-related material demonstrating critical reflections on your learning and linking of learning to your own context (15%)	Modules 1-10
Completion of Needs Analysis Document (15%) (formative feedback provided prior to final completion)	Module 2
Literature-based development of principles around learning technology and media (5%) (small group/pair assignment)	Module 3
Literature-based development of principles around the role of the teacher (5%) (small group/pair assignment)	Module 5
Sourcing and applying learning objects (10%)	Module 7
Course Development Document (50%), comprising:	
Reflective commentaries on completion of key aspects of the Course Development Document (20%)	Modules 4, 5, 6 & 10
Critique of a peer's draft Course Development Document (10%)	Module 8
Completion of final document (20%)	Modules 9-10

## Principles-Based Design within a Design Research Approach

We have chosen a design research approach to guide development and evaluation of the course (Bannan-Ritland, 2003; Kelly, 2003; Reeves, Herrington, & Oliver, 2005). This approach embraces 6 tenets: (1) A focus on broad-based, complex problems critical to higher education; (2) The integration of known and hypothetical design principles with technological affordances to render plausible solutions to these complex problems; (3) Rigorous and reflective inquiry to test and refine innovative learning environments as well as to reveal new design principles; (4) Long-term engagement involving continual refinement of protocols and questions; (5) Intensive collaboration among researchers and practitioners, and learning communities; (6) A commitment to theory construction and explanation while solving real-world problems (Reeves et al., 2005, p.103).

With regard to the first tenet above, we know that there are a range of factors associated with innovations within university departments that impact positively and negatively on implementation. These include accessibility of technology, reliability of networks, faculty ethos with regard to change and innovation (Meehan et al., 2002), change management and provision of appropriate resources (Minshul, 2004), vision, leadership, trust, encouragement and reward (Challis, Holt, & Rice, 2005). These factors contribute significantly to the success or otherwise of new initiatives. However appropriate training in the case of technologies remains an absolutely key issue. If educators are not given appropriate training, then the “likelihood of successful deployment and implementation of instructional technology is reduced” (Meehan et al., 2002, p. 6). In an earlier study into the challenges presented by introduction of flexible learning into the ‘traditional’ Faculty of Medical & Health Sciences at the University of Auckland (Gunn, McCormick & Honey, 2002), professional development and instructional design support for academic staff were identified as significant gaps. As staff uptake of elearning in the faculty has increased, staff have continued to require personalised and individually relevant support in technology use and course design (Doherty & Honey, 2006). These factors are also widely identified in the literature as playing a significant role in faculty uptake of educational technology (Ahmed, 2003; McLean, 2005; Sheehy, Marcus, Costa & Taylor, 2006; Roberts, Thomas, McFadden & Jacobs, 2006) We therefore consider that the problem of how best to support faculty in gaining instructional design skills and to subsequently use those skills to enhance student learning is sufficiently important to warrant close attention, and sufficiently broad-based to contribute to theory construction of more than just narrow interest.

In terms of the second tenet of the design research approach (Reeves et al, 2005), we have undertaken design and development of ClinEd 711 around 6 theory-based pedagogical principles that have underpinned a number of other course design projects that the Learning Technology Unit has completed. This strategy is premised on the notion that technology will be employed in a pedagogically sound manner when teaching and learning theories guide design (Lajoie & Azevedo, 2006). A summary of these principles is as follows.

### ***1. Learning should be meaningful for the individual; What is learned is determined primarily by related prior knowledge and how that is activated***

This principle is based upon Ausubel's meaningful reception learning (Ausubel, 1963) and its elaboration through schema theory (Anderson, Spiro, & Anderson, 1978). These cognitivist theories propose that learners actively seek meaning when encountering new information and that information is selectively processed and schematically encoded in long term memory under the influence of each individual's existing knowledge structures or ‘schemata’. Development of student knowledge and understanding is therefore maximised when students' prior knowledge is taken into account, when instruction is made meaningful for students through its content and organisation, and when students' relevant prior knowledge is activated (Bransford, Brown, & Cocking, 2000; Driscoll, 2005).

This principle has been realised in ClinEd 711 in the following ways:

- Students were asked to complete a pre-course survey intended to act as an advance organiser by activating prior knowledge whilst bridging into new course concepts. Survey questions sought to elicit knowledge and beliefs regarding technology use, teaching and curriculum, using categories derived from the ISTE National Educational Technology Standards and Performance Indicators for Teachers (International Society for Technology in Education, 2000): technology operations & concepts; teaching, learning, & curriculum; planning & designing learning environments and experiences; assessment & evaluation; productivity & professional practice; and social, ethical, legal, & human issues;
- Students chose their own learning design project, thereby ensuring that the project was personally meaningful and relevant to their particular educational context;
- Students were continually prompted via course tasks and assessment rubrics to relate new concepts to personal perspectives and experiences in teaching and learning. By way of example, the ‘quality of content’ component of the reflective commentary rubric is provided in Table 3.

*Table 3: ‘Quality of content’ component from the reflective commentary rubric*

Rating (9%)	Quality of content
5	Provides responses and questions that make <b>extensive and detailed reference</b> to relevant course readings, others' postings, and personal context and experience.
4	Provides responses and questions that make <b>significant reference</b> to relevant course readings, others' postings, and personal context and experience.
3	Provides responses and questions that make <b>some reference</b> to relevant course readings, others' postings, and personal context and experience.
2	Provides responses and questions that make <b>limited reference</b> to relevant course readings, others' postings, and personal context and experience.
1	Provides responses and questions that make <b>little or no reference</b> to relevant course readings, others' postings, and personal context and experience.

## ***2. Learning should be organised around core concepts and ideas in a field, with time spent traversing the subject matter to build linkages between core concepts and varied examples and contexts of application***

This principle is founded on a belief that the knowledge of experts “is organized around core concepts or ‘big ideas’ that guide their thinking about their domains” (Bransford et al., 2000, p.24). Clear conceptual understandings such as those that experts have constructed enable ‘chunking’ of information into familiar patterns for application in particular contexts, thereby increasing the processing power of short-term memory and the ability to solve problems (Bransford et al., 2000). Learners can be assisted in developing well-organised mental models through use of ‘comparative organisers’ (Ausubel, 1963, p.83) that compare and contrast ideas and topics, and ‘conceptual and pedagogical models’ (Driscoll, 2005, p.45) such as problem-solving strategies or heuristics, that help learners access and refine appropriate mental models.

Helping learners to develop organised mental models of complex concepts akin to those of experts is difficult. To try to overcome this, cognitive flexibility theory advocates “revisiting the same material, at different times, in rearranged contexts, for different purposes, and from different

conceptual perspectives” (Spiro, Feltovich, Jacobson, & Coulson, 1995, pp.93-94). Examples of implementation in ClinEd 711 included:

- Structuring the course website, tasks, readings, and resources around core concepts in the field of e-learning (refer Table 1 above);
- Providing course tasks that prompted students to visit and re-visit these concepts in the context of creating the Needs Analysis Document and Course Development Document for their projects. The reflective commentary task from Module 5, The Role of the Teacher, is provided in Figure 1.

**CDD - Reflective commentary**



Reflect on your design decisions by providing responses (approx. 150-200 words each, excluding references) to the following statements. *If you have doubts or questions about your decisions to date or the role of learning theory, express them as part of your response so that you are aware of gaps in your understanding and/or design.* Wherever possible, cite a source (from the course readings, others' discussion forum postings, or elsewhere, using [APA format](#)) to support your response:

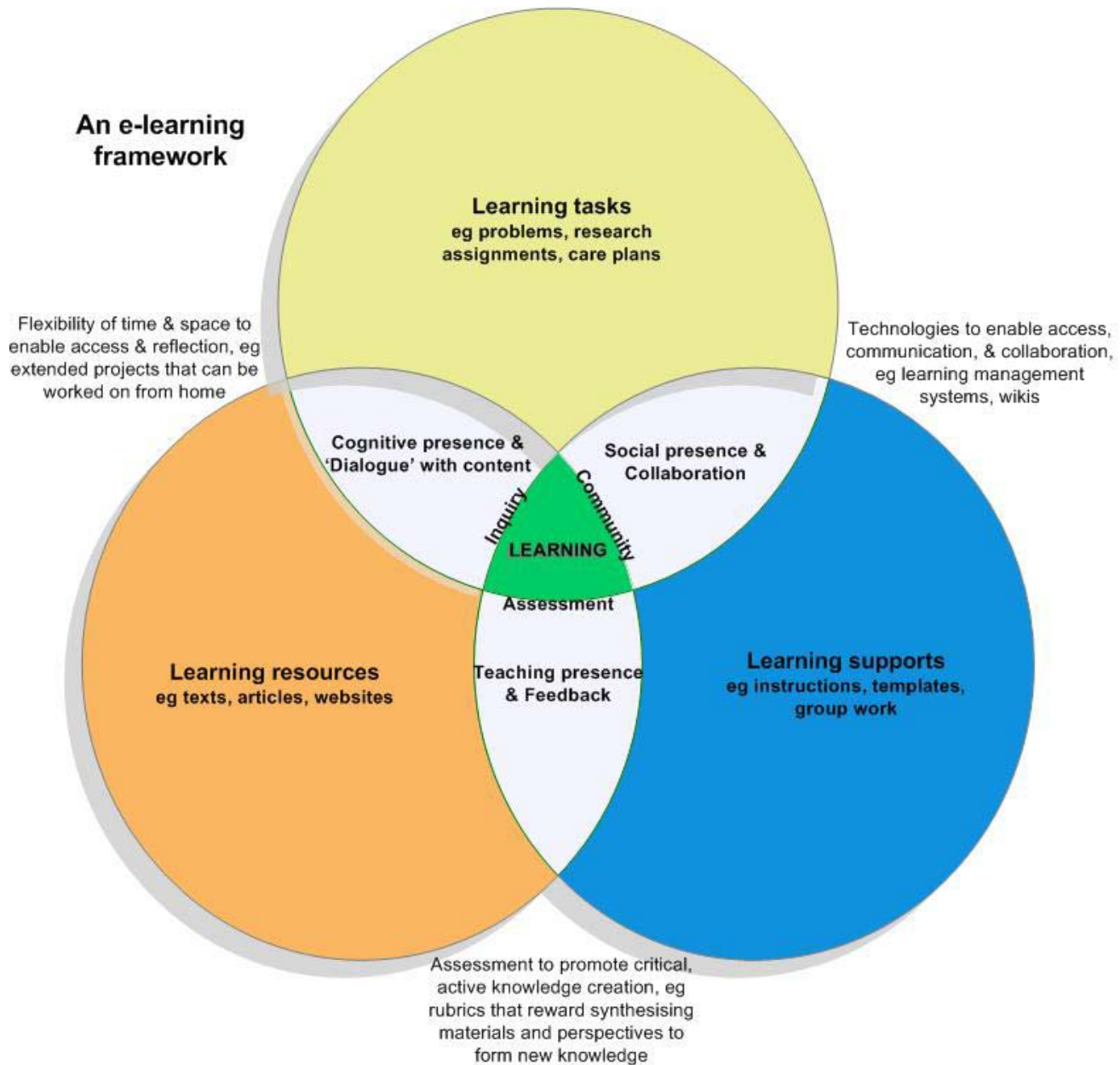
1. The teaching presence I intend to enact to enable my students to achieve the learning outcomes specified in the Needs Analysis Document will acknowledge the importance of my students' prior knowledge, and encourage them to take ownership of their own learning.
2. The supports (e.g. strategies, templates, announcements) I intend to build into the course materials and contribute during the course will model critical thinking and reflection appropriate to clinical practice.
3. The strategy underlying the teaching presence I intend to enact reflects the view of teaching and learning evidenced by my Teaching Perspectives Inventory results, but also reflects new insights I have gained into the role of the teacher and e-learning.

*Submit your reflection on completion of columns 5 and 6 of the Course Development Document to your blog for others to read by the end of week 9.*

Your work will be assessed according to [this rubric](#).

*Figure 1: Reflective commentary task from Module 5, The Role of the Teacher*

- Relating each of the module concepts to a graphical 'e-learning framework' (refer Figure 2) to provide a scaffold for construction of student knowledge.



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Adapted from:  
Oliver, R. & Herrington, J. (n.d.). Learning Designs. Retrieved January 18, 2006, from [http://www.learningdesigns.uow.edu.au/project/learn\\_design.htm](http://www.learningdesigns.uow.edu.au/project/learn_design.htm).  
Rourke, L., Anderson, T., Garrison, D.R., & Archer, W. (2001). Assessing social presence in asynchronous, text-based computer conferencing. *Journal of Distance Education*, 14(3), 51-70. Retrieved January 18, 2006, from [http://cade.athabascau.ca/vol14.2/rourke\\_et\\_al.html](http://cade.athabascau.ca/vol14.2/rourke_et_al.html).

Figure 2: E-learning framework used as a scaffold for course design and student learning

### **3. Learning tasks should replicate or simulate real-world problems in authentic contexts**

This principle is derived from the theory of situated learning, in which learning is said to occur through 'legitimate peripheral participation' in communities of practice (Lave & Wenger, 1991).



To develop expertise in a field, learners need to be provided with learning experiences that enhance their ability to recognise patterns of information that are meaningful for solving problems in that field (Bransford et al., 2000). This will not be possible if learning tasks are oversimplified or divorced from real world contexts. This implies learning constructed around real-world activities, artefacts, and interactions. In terms of coding of information and meaning, the objects at the heart of the activity together with the nature of the environment are just as important as mental processes (Lemke, 1997, p.38).

Strategies to implement this principle included:

- Structuring the Needs Analysis Document and associated rubric to prompt students to undertake a worthwhile learning design project with a focus on learning outcomes that would translate into real benefits for patients (refer Figure 3 for an excerpt from the Needs Analysis Document rubric).

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**ClinEd 711 - Rubric for Needs Analysis Document (15%)**

Rating (3%)	Clarity of project goal & rationale
5	Provides a description of a project goal that <b>explains clearly and convincingly</b> how it is intended to advance student learning outcomes and thereby benefit patients. Provides <b>clear and specific links</b> between the project goal, and aims and objectives in the institution's mission/charter, and/or teaching and learning plan.

*Figure 3: Excerpt from Needs Analysis Document rubric*

- Providing students with instructional design templates and resources equivalent to those used by the Learning Technology Unit in instructional design practice (refer Figure 4 for an excerpt from the Course Development Document);

**Scoping Questionnaire**

**Project Title:**

**Client:**

**Project Goal:**

**Development Team:**

**Project Objectives:**

**Structure of Learning Objectives and Content for Course/Module:**

Unit/Module/Topic	Learning objectives (consistent with Needs Analysis Document)	Learning hours	Who is responsible for content?

**What is the intended audience, and any characteristics that are relevant to your learning design and its implementation?**

*Figure 4: Excerpt from Course Development Document*

- Designing assessment and feedback to reward development of instructional design theory and skills rather than simple factual recall and comprehension (refer Figure 5 for the final reflective commentary task from Module 10).

***CDD and instructional design - Reflective commentary***



Reflect on your instructional design process and conceptions by providing responses (approx. 200 words each, excluding references) to the following statements. *Even though you are now reflecting on the course as a whole and final completion of your CDD, we encourage you to continue to express any doubts or questions about your design, the role of learning theory, etc; maintaining self-critique of actions and understanding are a healthy sign of reflective thinking and commitment to excellence.* Wherever possible, cite a source (from the course readings, others' discussion forum postings, or elsewhere, using [APA format](#)) to support your response:

1. There were strategies, resources, and processes that I found really helpful as I constructed my Course Development Document, and others that did not work for me.

2. Considering my project and the various elements of e-learning that I explored in this course, the depiction or metaphor for instructional design that I created in Module 9 provides a useful model of instructional design and the role it plays in teaching, learning, and professional development.

[Include your depiction or metaphor so that it can be viewed along with your reflective comments. You may wish to refer back to [Ryder's views](#) on the value of instructional design models].

3. The strategy underlying my learning design reflects the view of teaching and learning evidenced by my Teaching Perspectives Inventory results, but also reflects new insights I have gained into clinical education, e-learning, and instructional design.

*Submit your final reflections to your blog for others to read by the end of week 15.*

Your work will be assessed according to [this rubric](#).

Figure 5: Module 10 reflective commentary task

***4. Learning should involve collaborative construction of knowledge through social negotiation***

This principle is based on interactional theories of cognitive development (Bruner, 2006; Vygotsky, 1978). These focus primarily on social and cultural activity, rather than the individual, in considering how development takes place. Learning occurs when social interactions between a learner and others are converted into “internal speech and reflective thought” (Vygotsky, 1978, p.90). Thus, key to cognitive development is interaction with others in order to provide “exposure to the specialized environment of a culture” (Bruner, 2006, p.87). An individual learner’s knowledge can be seen as both a contribution to, and a by-product of, the collective knowledge constructed when he or she negotiates meaning with others in collaborating on a learning task (O’Donnell, 2006).

Essential too in Vygotsky’s emphasis on the centrality of social relations to learning is the notion of the “zone of proximal development” (Vygotsky, 1978, p.86). This is the gap between what a learner can achieve unassisted, and what s/he can do with the guidance of an instructor or in collaboration with more capable peers. To maximize advantage in the zone of proximal development, it is therefore essential that a learner is “interacting with people in his environment and in cooperation with his peers” (Vygotsky, 1978, p.90).

Implementation of this principle included:

- Discussion forum topics requiring students to explicate and reflect on personal teaching and learning perspectives and actions (Pratt & Collins, 2001) in the context of their teaching roles (refer Figure 6 for an example discussion topic from Module 2);

**Discussion**



How do your TPI results compare with the view of teaching and learning you expressed in the Introductions forum? How do the results relate to your current teaching practice? Can you see any links to the broad theories of learning outlined in the [rationale for this module](#) and in the readings? Provide a brief analysis of your TPI results for your colleagues to read and respond to. Click on **Discussions** in the left hand sidebar, then on *Teaching Perspectives*.

Use the course readings, others' postings, and your personal context and experience as the basis and justification for your postings.

Figure 6: Discussion forum topic from Module 2

- Tasks requiring collaboration to produce agreed sets of principles for selection and implementation of educational technology and for the role of the teacher in the online environment. Students collaborated in pairs using wikis during Modules 3 and 5, to develop principles for these topics that would be of broad benefit to colleagues seeking guidance for development and facilitation of e-learning;
- Exchange of Course Development Document drafts for peer evaluation followed by revision based on the peer feedback received (refer Figure 7 for the peer review task from Module 8).

**CDD - Peer Review**



Visit the blog of your assigned peer, and access their Course Development Document.

Review their CDD against the [Herrington et al \(2001\)](#) audit instrument.

For each of the criteria in turn under Pedagogies, Resources, and Delivery Strategies\* (and noting the description provided for each criterion):

- locate the best example you can find for how the instructional design demonstrates that criterion, and describe why you consider it a good exemplar
- provide one suggestion for improving the design to even better satisfy that criterion, together with a justification.

[\* As we are using the audit instrument to evaluate development of new materials, some of the Delivery Strategies criteria are difficult to evaluate prior to development occurring. Under the Delivery Strategies category we will use only the "Clear goals, directions and learning plans" and "Communication" criteria.]

Post your feedback as a comment on your peer's blog by the end of week 13 (i.e. by Sunday at the end of the second week of Module 8).

Your work will be assessed according to [this rubric](#).

Figure 7: Course Development Document peer review task

### **5. Learning should employ strategies that appeal to multiple sensory modes and cognitive capabilities**

This principle receives support from cognitive information processing theory, particularly the dual-code model of long term memory (Paivio, 1986). This model proposes two systems of memory representation, one for verbal and one for non-verbal information and posits a strong connection between each of the two modes. Problem-solving transfer has been shown to increase significantly when instruction employs text and illustrations, or narration and animation, rather than just text or words alone (Mayer, 2003). Further, Gardner (1983) conducted research showing that memory and cognitive processing are modular, and proposed seven different types of cognitive capacity or ‘intelligences’. Driscoll notes that irrespective of whether humans possess the multiple intelligences distinguished by Gardner (1983), they certainly possess “some differentiation of cognitive function that is neurologically based” (Driscoll, 2005, p.298). Driscoll proposes therefore that learners are likely to vary widely in cognitive ability and information processing preferences, and that this implies that “different instructional strategies [are] suitable for each type” (Driscoll, 2005, p.300). Presenting material in multiple modes overlaps to some extent too with cognitive flexibility theory (Spiro et al., 1995) referred to above. On this point, Driscoll observes that presenting content in multiple formats provides for the opportunity for learners to appreciate different aspects of that content (Driscoll, 2005, p.399).

Steps to implement this principle included:

- Offering a significant proportion of learning content in the form of text plus images, together with links to multimedia resources and audio podcasts;
- Course tasks providing for interaction via threaded discussion, wikis, and personal blogs and encouraging graphical representation of knowledge as an option for some tasks;
- Assessment that rewards various forms of participation, reflection, and theorising for both individual and collaborative work, using both structured written or graphical outputs as well as less formal online discussion.

Figure 8 provides an excerpt from the Module 3 Tasks & Interaction webpage, demonstrating a range of modes of presentation and engagement.







<p><b>Web resources</b></p> 	<p>Browse the e-learning tools and systems at the <a href="#">e-Learning Centre website</a>. This will give you a sense of the huge range of digital technologies available for e- learning.</p> <p>Browse information on <a href="#">educational technology</a> and <a href="#">e- learning 2.0</a>.</p>
<p><b>Readings</b></p> 	<p>Complete the Module 3 readings. You can link to these <a href="#">here</a> (opens Library page in a new browser window) or via the  <b>Library</b> tab at the left of your screen.</p>
<p><b>Media</b></p> 	<p>[optional]</p> <p><a href="#">Wikis, blogs, podcasts: Oh My!</a></p> <p>Dean Owen, Red Deer College, Alberta, Canada (20 min. 13 sec.)</p>  <p>Creative Commons license: <a href="#">Attribution- NonCommercial- NoDerivs</a></p> <p>This episode is a location recording of a Faculty professional development session held on August 28, 2006 in the Library Instruction Lab:</p> <p>"How do students really use the net? This session will look at the way students use the net for communication, for information, and for fun. We'll explore wikis (and Wikipedia), blogs, podcasts, downloads, and more. We'll also discuss some of the downside of the social aspects of the web such as privacy and security concerns."</p>
<p><b>Group Task</b></p> 	<p>You have been approached by a colleague from another institution. She is also involved in clinical education. She is trying to convince her colleagues that e- learning can be of benefit to the institution's students, and is looking to enlist their support, but is finding it an uphill battle. She has some ideas for using technology to support student learning, but says she</p>

Figure 8: Excerpt from Module 3 Tasks & Interaction webpage

**6. Learning tasks should help learners to develop metacognition and reflective practice**

This principle is based upon the need to: equip learners to continually monitor their own motivations, strengths, weaknesses, performance, and learning, to nurture both 'reflection-in-action' and 'reflection-on-action' (Schön, 1987). Bransford et al (2000) refer to the desirability of 'adaptive expertise' noting that, "Adaptive experts... are metacognitive and continually question their current levels of expertise and attempt to move beyond them. They don't simply attempt to do the same things more efficiently; they attempt to do things better"(Bransford et al., 2000, p.48).

Examples of implementation included:

- Multiple avenues for students to gain personalised feedback on thought processes and outputs including class discussion forums, blogs, and instructor comments based on detailed rubric categories. For example, students received personalised feedback based on each of the rubric

categories for the Course Development Document. The categories were as follows: clarity of learning objectives & content; audience characteristics & past delivery; teaching/learning strategy; clarity of learning design; consistency with & implementation of teaching/learning strategy, project goal, & project rationale; effectiveness as a blueprint to achieve learning objectives; and evidence of satisfaction of relevant ‘Quality guidelines for online courses’ Herrington et al (2001).

- Peer evaluation of each student’s Course Development Document using an audit instrument for online instruction (Herrington, Herrington, Oliver, Stoney, & Willis, 2001) in order to prompt reflection on and links between theory and practice;
- The creation of learning tasks and rubrics to prompt students to consider how their learning relates to practice, how their instructional design proposals relate to student/societal needs and their personal perspectives on teaching and learning, and how their learning design solutions compare to those of peers and more experienced practitioners. Examples of such tasks and rubrics can be seen in Figures 1, 3, 5 and 7 above.

The emphasis in ClinEd 711 is on promoting students’ reflection on teaching and learning principles to encourage students to employ technology effectively to support their respective teaching and learning strategies. This approach accords with research into training teachers in the use of technology which suggests that focussing on teaching and learning leads to deeper, more meaningful learning (Ahmed, 2003; Leh, 2005). The approach of ClinEd 711 also accords with literature supporting the notion that effective education in the use of technology for teaching and learning occurs when learners construct their own learning (Adams, 2005; Leh, 2005, p. 30; Minshul, 2004) in practical situations and in collaboration with others (Meehan, Obler, Schiorring, & Serban, 2002). Thus, the module on technology encourages a critical approach to what constitutes ‘technology’, and proposes that technologies are not neutral and are fundamentally dependent upon their context of use. Students are also responsible for collaborating with one another in order to create a set of agreed principles for selection and implementation of educational technologies referenced to literature and learning theories (refer to Figure 9 for an excerpt from the rubric for this task).

**ClinEd 711 - Rubric for small group/pair formulation of teaching/learning principles (2 x 5%)**

Rating (2%)	Clarity and usefulness of principles
5	Provides 5-10 principles that are <b>clearly and elegantly communicated</b> (textually and/or graphically), with potential for <b>extensive application and benefit</b> in clinical teaching and learning.

*Figure 9: Excerpt from literature-based development of principles rubric*

**Research Project**

Our research hypothesis as stated in our university ethics application was that, “Teaching instructional design principles to clinical educators prepares clinical educators to teach effectively with technology”. Our research methodology should be understood in terms of the third, fourth, fifth, and sixth tenets of the design research approach, namely (3) Rigorous and reflective inquiry to test and refine innovative learning environments – the environment in this case being ClinEd 711 – as well as to reveal new design principles for future iterations of learning environments; (4) Long-term engagement involving continual refinement of research protocols and questions; (5) Intensive collaboration among researchers and practitioners, and learning communities; (6) A commitment to theory construction and explanation whilst solving real-world problems (Reeves et

al., 2005). In order to test the research hypothesis we needed to assess the preparedness of educators to teach with technology prior to taking ClinEd 711 and then to assess the preparedness of educators to teach with technology once they had completed the course. We also needed to follow up with students once they had completed the course to evaluate the practical import of the course. In order to measure pre and post preparedness students were asked to complete a questionnaire with 10 true/false and 27 Likert scale questions based on categories derived from the ISTE National Educational Technology Standards and Performance Indicators for Teachers (International Society for Technology in Education, 2000) (refer Figure 10 for example Likert scale questions).

### **1 Technology operations & concepts\***

- 1.1 I am experienced in teaching and learning online
- 1.2 I am experienced in use of learning management systems
- 1.3 I am familiar with threaded discussions and their use in teaching and learning
- 1.4 I am familiar with blogs, wikis, and podcasts and their use in teaching and learning
- 1.5 I am familiar with the creation and use of learning objects

### **2 Teaching, learning, & curriculum**

- 2.1 I have a clear philosophy of what it means to learn
- 2.2 I have a clear philosophy of what it means to teach
- 2.3 Learning online reduces the quality of communication between learners

*Figure 10: Example questions from pre-/post-course survey (5 point Likert scale)*

The follow up with the students will be conducted by telephone interview one year after completion of the course. This will allow researchers to measure the degree to which the clinical educators implemented what they learned on ClinEd 711. The telephone interview should also allow researchers to measure factors that impacted both positively and negatively on ClinEd 711 students' intentions to implement their ClinEd 711 learning in their teaching practice. Key measures of effectiveness will include: how ClinEd 711 students subsequently utilize technology in their teaching (the amount and quality of electronically-based course work they deliver); barriers such as institutional resistance that hindered the implementation of their intended changes to their courses; enabling factors such as departmental support that helped to facilitate changes to teaching practice; and the impact that ClinEd 711 had on their perspectives on teaching, teaching practices, and attitudes towards teaching with technology. The one year follow up will also ask students about their perceptions of the course itself in terms of strengths and weakness thereby providing us with further data to refine the learning environment for ClinEd 711.

Two further sources of data on course effectiveness are provided by the standard university course evaluation questionnaire that is required to be administered for all courses, and the external assessor's report that the university requires for the first iteration of all new courses.

The data collected from the various forms of evaluation will inform the content and delivery of ClinEd 711 and that of other courses delivered in a similar format, as well as contributing to



literature in education, clinical teaching and teaching with technology. Our aim is to conduct rigorous and reflective inquiry to test and refine the design principles and implementation measures underpinning the course, in order to enable “research audiences to evaluate the credibility of design decisions, and the quality of lessons learned from the research” (Collins, Joseph, & Bielaczyc, 2004, p. 34). Below we outline data so far gathered from the first iteration of the course, and foreshadow likely design changes we will make as a result.

### **First Time Delivery of ClinEd 711**

ClinEd 711 was delivered for the first time in Semester 1, 2007, alongside a core course in the new Clinical Education Programme. Student numbers for the first iteration were low, with only 4 students participating in the course. All were practising health professionals with some involvement in clinical teaching. As a course which is not offered as part of the ClinEd PGCert, and which is an optional course for both the ClinEd PGDip and Masters, it was expected that numbers would be lower than for other core courses, especially when offered in the very first semester of the new ClinEd programme. Given that enrolments for the first offerings in the core courses have been in the region of 10-14 students during 2007, we are anticipating that a proportion of those students will begin to look to options such as ClinEd 711 from 2008 onwards.

All four course participants completed the pre-course survey, but only two completed the post-course survey. The responses did not deliver the clarity that we sought regarding student skills in, and perceptions of, teaching and learning with technology. This lack of clarity resulted from the nature of the question set rather than from the low response rates although we would note the undesirability of a low response rate from a research perspective. Rather than a large number of true/false and Likert scale questions, it may be preferable to administer a far smaller number of text-response questions. The rationale for this change is that the question set did not provide sufficiently in depth information concerning educators’ preparedness to teach with technology before and after the course. Our judgement is that more open ended questions would have yielded more meaningful data. We will therefore review our survey approach prior to the next course iteration of ClinEd 711.

Useful information on student perceptions of the course was gained from the standard university course evaluation questionnaire, which was completed by three participants. This indicated that the course was very effective overall, with all respondents ‘strongly agreeing’: that the course motivated them to learn; that the course was intellectually stimulating; that the tutor provided helpful feedback; and that the course enabled them to enhance their teaching practice. Areas of concern on the part of the students related to volume of work, course pace, and materials access and communication via the course LMS. Responses to the question, “What was most helpful to your learning” included:

*Having a course overview and CD at the outset. Knowing it was a first time course and that it would be overloaded (have experienced this before). Hearing from (online) other students and feedback from facilitator was excellent as was the ability to contact/response time. This has been the hardest workload for a long time but one of the most interesting and learning experiences for a very verbal person! Good to be challenged into using an alternative method.*

*The many ways of feedback. I was able to submit what I felt was a high quality project, with real world application. I was also able to enhance my learning of individual areas in the process.*

*The ongoing processing of course materials: but this was also what lead to my feeling that there was too much assessment and just too many tasks to realistically complete.*

Responses to the question, “What improvements would you like to see” included:

*Content reduced, cooperative task at the outset, maybe 2nd week with actual marks attached to cooperation. Group contract? Testing the material for usability i.e. the CDD uploads, Cecil's [the University learning management system] functionality improved. Perhaps an extra 2 weeks in the timeframe. Having weekly deadlines kept me on track but prevented me leaving town! Maybe introducing people into the discussion forum in a more informal way to start as it seemed to take a while for people to "warm up".*

*Less assessment generally - the course wasn't realistic in the amount of work required each week.*

The report from the external assessor stated:

*The course is very comprehensive and intensive, and shows evidence of very careful planning. There is a clear commitment to the learning objectives, and much evidence that students are required to relate their thinking and plans to sound learning theory. Markers are providing very useful and full feedback. The creative and practically-oriented assessment tasks themselves are to be lauded. It seems that the course teachers are modeling excellent tutoring techniques.*

*One thing that might be improved is the assignment load and the intensive periods of activity it must require. Small group assignments worth only a small percentage of the final grade seldom reflect the actual effort required for their completion. If the awarding of 5% is nothing more than an incentive, the assignment should, in my opinion, be removed from the course. If collaborative work is worth rewarding, it is worth rewarding fully. While students can contribute in their own time in online education, they are reliant on others' timing for the purposes of collaboration. Collaborative activities are best spread over a number of weeks with clear deadlines and milestones, and the overall grade should reflect the complexities of collaborative activity. Additionally, the use of collaborative tasks in assignments can be frustrating for students who prefer to study in single blocks of time rather than spread within a specific time frame.*

*The assessment schedule certainly spreads the overall course workload evenly; while this is defensible, it is not a standard practice in e-learning or distance education. One reason is that evenly spread loads tend to reduce flexibility for students, who often work in a 'peak and trough' style as their typically busy lives permit them to.*

From a teaching perspective, it was very rewarding to be involved with the students as they engaged with learning theory and design issues as part of online discussion, collaboration and reflection tasks, and to see their insights deepen as they developed sound e-learning design blueprints for very worthwhile health education projects. The large number of assessable tasks, each with a detailed rubric, meant that students received frequent and detailed personal feedback. The volume of course tasks however led to expressions of fatigue by students late in the course and meant a fairly high instructor workload despite low student numbers. Although students were generally active in collaboration and communication, the low student numbers also meant that for the most part there was a lack of the ‘critical mass’ that enables really productive discussion forum exchanges to develop.

## Conclusion

The one year post-course interviews - the most significant source of data for our research project – are not due to be conducted until June 2008. Nevertheless, the data we have garnered from the first iteration of the course enables some preliminary reflection on the learning principles that underpin the course and the measures we have used to implement them.

Motivation to learn, intellectual stimulation, quality of feedback, and enhancement of practice provided by the course were all rated extremely highly by the students who responded to the course evaluation questionnaire. Anecdotally, we are aware of one student's ClinEd 711 course design project having been implemented already as an e-learning component for undergraduate pharmacy students, and another being used as the basis for a course upgrade now being developed for the medical programme. As a whole then, using the 6 principles as the basis for the course design appears to have been successful. The main issues to emerge were:

- Low student numbers and assessment of collaborative work. These impact most directly on principle 4 (collaborative construction of knowledge).
- Course pace and workload. These relate perhaps most directly to principle 2 (learning should be organized around core concepts with time spent creating multiple linkages) and principle 6 (learning tasks should help develop metacognition and reflective practice).

As we prepare for the second iteration of the course in 2008, our aim is to revise the course to create a less rigid course structure and reduced workload allowing students greater freedom to explore research literature and technologies, whilst seeking to maintain student engagement with the course content, with the other students and with the tutor. We are considering how to best reduce the number of assessable tasks, provide the opportunity for more self-motivated, informal reflection (perhaps through use of a social networking environment such as Elgg, <http://elgg.org/> as the hub for course communications), cater for a small or large number of students enrolling for the course, better reward student collaboration via a single, more substantial project, and increase yet further the authenticity (and creativity) of the project work the students undertake through use of an e-learning editor (such as the eXe e-learning editor, <http://exelearning.org/>) for creation of the Course Development Document.

Data we gain from the one year post-course interviews with participants from the first iteration of the course, and implementation of changes for the second iteration, should enable us to determine how we can begin to revise our learning principles to make provision for these issues.

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