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Chapter 9

Researching authentic e-learning

There is much anecdotal evidence to suggest that authentic e-learning courses and tasks are an effective approach to facilitate students' higher order learning. However, while authentic learning designs as described here, are theoretically sound, more research is required to assist teachers in design and implementation strategies to fully realise the potential of the approach.

Complex tasks by their very nature create considerable diversity of outcomes, and it is often difficult to foresee the design, implementation, and maintenance challenges that will inevitably arise. In our research, we have noticed that the teachers using these approaches have a deep commitment to the educational philosophy of authenticity, and a capacity for hard work above and beyond the usual level required (or recognised) for the development of an e-learning course. The problems they encounter are complex and not easily solved, ranging from institutional factors (such as restrictive university policy, the costs of development, and the unreliability of technology infrastructure), to personal teaching factors (such as the necessity to learn a new teaching role), and to learning issues (such as the level of support and guidance needed by students and how to help them deal with their inevitable anxieties).

Because this is new territory, teachers are left without appropriate guidelines in often difficult circumstances. There is a huge gap between the theoretical ideal and the practical realisation of these innovative approaches, and effective models, principles and guidelines are needed by faculty members, educational designers, and academic administrators who are prepared to challenge the dominant teaching practices in higher education today.

There is a need for ongoing research in authentic e-learning to provide the guidelines needed across a range of discipline areas and problem contexts in education in higher education.

The need for a different kind of research

The February 9, 2004 issue of the *New Yorker* magazine included a short piece entitled *Chew On* by Ben McGrath. The story described an educational computing research study undertaken in dentistry at New York University by Dr. Kenneth L. Allen and colleagues. The aims of the research, as also reported at the annual conference of the International Association of Dental Research (Allen, Galvis, & Katz, 2004), were:

1. To compare two methods of teaching dental anatomy: 'CD + lab' versus 'standard lecture + lab', and
2. To determine whether actively chewing gum during lecture, lab and studying would have an effect on learning.

According to the *New Yorker* article, Allen and his colleagues originally intended only to compare the effectiveness of an interactive CD-ROM about dental anatomy and a standard dental anatomy lecture, but lacking funding, they incorporated chewing gum into the study at the behest of the Wrigley's company which was interested in the effects of chewing its products on learning.

No one familiar with the frustrating history of instructional technology's impact on learning (Clark, 2001; Cuban, 2001) will be surprised that there were no statistically significant differences found between the test scores of the students using the dental anatomy CD-ROM versus those who attended a dental anatomy lecture. Although the chewing gum results also failed to reach statistical significance, the authors concluded that the finding that 'the chewing gum group (n= 29) had an average of 83.6 [on a 25 question objective exam] vs. 78.8 for the no chewing gum group (n=27)' appeared to be 'educationally significant'.

The *New Yorker* writer poked fun at Dr. Allen, suggesting that he might want to extend his research to investigations of the impact on learning of chewing tobacco or biting fingernails, but there is little doubt that Dr. Allen, like numerous other faculty members from virtually every academic discipline, sincerely hoped to find that the interactive multimedia CD-ROM was a more effective instructional treatment than a traditional lecture.

What motivates this widespread belief in the potential of virtually any form of interactive technology itself among so many higher educators despite the considerable evidence (Dillon & Gabbard, 1998; Russell, 1999) that such faith is misplaced? And why are such comparative studies so frequently conducted in educational research?

Comparative studies

Research is needed to meet the types of challenges facing e-learning educators, but not the type of research that has dominated education technology for the past fifty years. The most common type of study found in the research literature compares changes in delivery medium (e.g., online versus lecture) instead of comparing differences in pedagogical design (e.g., engaging in authentic tasks versus attending lectures). Clearly, there is an urgent need for *design research* (also known as *design-based research*, *development research* and *design experiments*) (van den Akker, 1999; van den Akker, et al., 2006) to provide design guidelines for enhancing e-teaching and e-learning.

Design research is distinctly different from the experimental research methods that have long been applied in our field (Ross, Morrison, & Lowther, 2005). Most instructional technology and e-learning research reported in the higher education literature has studied the effects of relatively small changes to specific courses. The chewing gum study by Allen et al. (2004) is a case in point in that the researchers compared one 50-minute lecture within a dental anatomy course with the use of an interactive multimedia CD-ROM. Decades of similar small-scale, isolated studies have failed to provide academics with a robust set of design principles that can guide them in the integration of computers and other technologies into teaching and learning at the postsecondary level. Although there is renewed enthusiasm for experimental research designs among some educational researchers (cf., Feuer, 2002), we do not believe that this is the most fruitful path for a design field such as e-learning.

Changing the mental models of researchers from those that are primarily experimental to those that are developmental is not an easy task, especially given the prevalence of media comparison studies using experimental methods in the field of educational technology for nearly a century.

Saettler (1990) found evidence of experimental comparisons of educational films with classroom instruction in the US as far back as the 1920s, and comparative research designs have been applied to every new educational technology since then, including programmed instruction,

instructional television and computer-based instruction. However, for decades the results of such media comparison research studies have usually reported 'no significant differences' (Russell, 1999). Not surprisingly, much of the existing research related to e-learning continues in the same vein, that is, comparing online courses with so-called 'traditional' classroom courses (e.g., Cheng, Lehman, & Armstrong, 1991; Koory, 2003; MacDonald & Bartlett, 2000).

Recently, Bernard, Lou, Abrami, Wozney, Borokhovski, Wallet, Wade, and Fiset (2004) reported a comprehensive meta-analysis of 157 empirical comparisons of distance education courses with face-to-face instruction courses between 1985 and 2003. Although not all the distance education courses in the studies analysed were online, many were. Altogether they found over 1000 comparison studies in the research literature, but the majority of the studies did not meet their criteria for inclusion in the meta-analysis.

Earlier reviews have found that comparison studies are often flawed by problems such as specification error, lack of linkage to theoretical foundations, inadequate literature reviews, poor treatment implementation, major measurement flaws, inconsequential learning outcomes for research participants, inadequate sample sizes, inaccurate statistical analyses, and meaningless discussions of results (Reeves, 1993c). Bernard et al. (2004) reported a very small, but statistically 'significant, positive mean effect size for interactive distance education over traditional classroom instruction on student achievement' as well as small, but statistically significant, 'negative effect for retention rate' (p. 2). Further analysis indicated that synchronous communication and two-way audio and video were among the conditions that contributed to effective distance education. While this meta-analysis is excellent in its design and reporting, its findings, as well as those derived from other related meta-analyses (Cavanaugh, 2001; Machtmes & Asher, 2000), fall far short with respect to specifying design guidelines for e-learning.

Design research

To provide design guidelines for developing and implementing effective e-learning designs, there is an urgent need for design research (Bannan-Ritland, 2003; Design-Based Research Collective, 2003; Kelly, 2003; van den Akker, et al., 2006). Van den Akker (1999) provided a succinct description of design research:

> More than most other research approaches, [design] research aims at making both practical and scientific contributions. In the search for

> innovative 'solutions' for educational problems, interaction with practitioners…is essential. The ultimate aim is not to test whether theory, when applied to practice, is a good predictor of events. The interrelation between theory and practice is more complex and dynamic: is it possible to create a practical and effective intervention for an existing problem or intended change in the real world? The innovative challenge is usually quite substantial, otherwise the research would not be initiated at all. Interaction with practitioners is needed to gradually clarify both the problem at stake and the characteristics of its potential solution. An iterative process of 'successive approximation' or 'evolutionary prototyping' of the 'ideal' intervention is desirable. Direct application of theory is not sufficient to solve those complicated problems. (pp. 8-9)

Design research has its origins in educators' pragmatic desire to improve learning, not in a purely functional sense, but from an informed theoretical perspective. It is grounded in the practical reality of the teacher, from the identification of significant educational problems to the iterative nature of the proposed solutions. However, theoretical foundations and claims are crucial to the design of solutions—as noted by Cobb, Confrey, diSessa, Lehrer and Shauble (2003), 'the theory must do real work' (p. 10). Theory informing practice is at the heart of the approach, and the creation of design principles and guidelines enables research outcomes to be transformed into educational practice. Design research:

- focuses on broad-based, complex problems critical to education
- involves intensive collaboration among researchers and practitioners
- integrates known and hypothetical design principles with technological affordances to render plausible solutions to these complex problems
- conducts rigorous and reflective inquiry to test and refine innovative learning designs as well as to reveal new design principles
- requires long-term engagement that allows for continual refinement of protocols and questions, and
- maintains a commitment to theory construction and explanation while solving real-world problems.

At this stage in the development of e-learning, there is a clear need to further the understanding of the more effective and successful approaches and their relationships with underpinning theoretical principles and

technological affordances (Anderson, 2003). There is a huge gap between the theoretical ideal and the practical realisation of these innovative approaches, and effective models, principles and guidelines are needed by teachers, instructional designers, and academic administrators who are prepared to challenge the dominant teaching practices in higher education today. Design research is an effective way to address this need.

Phases of educational design research

Design research is an iterative and lengthy process, but Reeves (2006) proposed that it can be viewed as four connected phases (Figure 34).

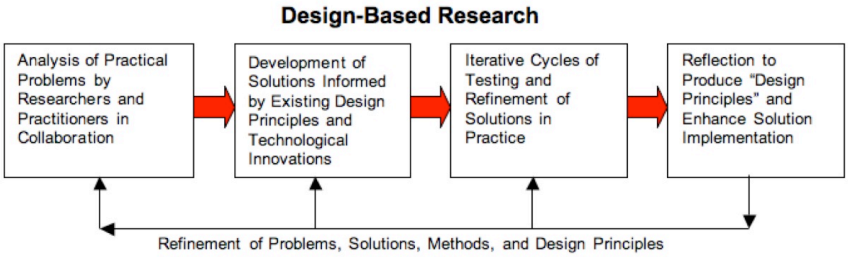

Figure 34: Four phases of design research (Reeves, 2006, p. 59)

Each of these four phases is described below, together with a description of the practical considerations in each phase and guiding questions for educators planning the research.

PHASE 1: Analysis of practical problems by researchers and practitioners

There are three key processes and products that form the first phase of design research.

The problem

In design research in education, the identification and exploration of a significant educational problem is a crucial first step. It is this problem that creates a purpose for the research, and it is the creation and evaluation of a potential solution to this problem that forms the focus of the entire study. Many researchers, particularly those using educational technologies, start by thinking of a solution—such as a technology-based intervention, an educational game, an e-learning site, or a technology tool—before they even begin to consider the educational problem it could

solve. Problems then arise when the solution is revealed to be a stand-alone, pre-conceived product rather than a genuine attempt to solve an educational problem.

Edelson (2006) commented on the basic assumptions of design research, pointing out that:

> It begins with the basic assumption that existing practices are inadequate or can, at least, be improved upon, so that new practices are necessary. The underlying questions behind design research are the same as those that drive innovative design: What alternatives are there to current educational practices? How can these alternatives be established and sustained? (p. 103)

The first step in design research is to identify and explore a significant educational problem. A practical question to consider is: What is the educational problem that the research will address?

The practitioners

In the first phase, practitioners (such as teachers) and researchers together explore the nature of the educational issue or problem facing students. It is important for practitioners to be involved in this phase so that the full extent of the problem is known, rather than being interpreted solely by researchers. Questions such as the following help to focus this aspect of the enquiry:

- Who are the teachers/students/practitioners that are knowledgable about or 'own' the problem?

  For example, colleagues who teach in a relevant course, teachers from other universities, or academics from professional associations might be consulted.
- What data will be collected from these practitioners?

  For example, practitioners might be interviewed individually (with the researcher audio recording or taking notes), or focus group discussions could be conducted with all practitioners together.
- What questions will be asked?

  For example, the practitioners might be asked their views on the problem, and their suggestions for how to solve it. Relevant issues that have been discussed in the literature might also be addressed.
- How will these data be analysed?

For example, practitioners' comments might be organised to create a list of recurring themes, together with a list of suggestions and advice on how to improve the situation.

The literature review

A literature review is also conducted in this phase to refer to the work that has already been done in the area or in related areas, and how similar problems might have been addressed in another field. A question such as the following is relevant for this stage of the research:

- What are the key references in the area of interest?
  For example, conduct a keyword or database search, or a Google Scholar search to find key people working in the area, or use known papers to follow references. Include both seminal works and recent publications.

The research questions

After this initial investigation of the problem, related literature and practitioners' ideas, it should be possible to create research questions to guide the research.

By the end of this phase, there is a clear description of the problem and its educational context, a literature review, a summary analysis of practitioners' views, and preliminary research questions.

PHASE 2: Development of solutions informed by existing design principles and technological innovations

In the second phase of design research, a solution to the problem (or intervention) is proposed that can be implemented in the educational setting. In order to create the solution, again the literature is consulted to find relevant theory that can guide thinking, as well as locate existing design principles that may have addressed a similar problem.

Draft principles in the literature

A literature review in design research performs not only the usual functions associated with a review—such as, the identification, location and analysis of documents relating to the research problem (Gay, 1992), or the building of a logical framework for the research, and identification of gaps in research (Marshall & Rossman, 1999). The second literature review process is a critical stage in design research because it facilitates the

creation of draft design guidelines to inform the design and development of the intervention that will seek to address the identified problem.

Once again the literature should be consulted for design principles that others have suggested. They may not be called design principles, but could appear to be advice on how to create particular learning tasks or address particular problems. For example, our own guidelines for authentic learning environments and authentic tasks in Chapters 1 and 2 are design principles.

The following example lists are also forms of design principles because they give advice on designing for particular circumstances or outcomes:

Example 1: Jonassen: Constructivist learning environments

Jonassen (1994) proposed that knowledge construction may best be facilitated by constructivist learning environments which:

- provide multiple representations of reality, which avoid oversimplification
- focus on knowledge construction, not reproduction
- present authentic tasks (contextualising rather than abstract instruction)
- provide real world, case based learning environments rather than pre-determined instructional sequences
- foster reflective practice
- enable context- and content-dependent knowledge construction
- support collaborative construction of knowledge through social negotiation, not competition (p. 35).

Example 2: Boud and Knights: Reflection in learning

Boud and Knights (1996) proposed that the following are important in introducing and establishing a productive climate for reflection:

- articulating an educational rationale for the process
- introducing a simple exercise to illustrate reflection
- providing an opportunity for students to clarify their understanding of the idea
- introducing a framework or model to aid thinking about elements of reflection
- modelling a reflective approach in one's own presentation of the idea

- identifying areas of the process that students can make their own
- providing time
- treating reflection as a normal activity.

Other researchers may have addressed a similar problem and determined design principles of relevance. A more focussed literature search should help to locate these specific principles.

The next step is to create a list of draft principles to guide the design of the intervention or solution to the problem that was explored in Phase 1. This step can take some analysis, as it will need to combine theory of learning with existing principles, as well as the ideas collected from the practitioners. Some questions to consider at this stage include:

- What are the most relevant research papers that provide design principles or design advice?

  Choose several papers that seem closest to the problem area and extract their design principles where possible. These principles are not always conveniently listed as dot points, but may be described in the papers in paragraphs or under headings.
- What learning theory or approaches are most helpful in addressing the problem?

  For example, does the proposed solution involve theory such as situated learning, distributed learning, communities of practice, or problem-based learning?
- What are draft principles to guide the design of the solution?

  Using the theory and principles from the literature review, and the interviews conducted with the practitioners, principles can be drafted to guide the design of the intervention. This can be done in a table such as Table 5 below. Adapting and using the stem provided in the table will help to keep the principles quite specific and naturally prompt each to start with a verb (e.g., allow, provide opportunities for, promote, enable, support, etc.). In the second column, reference can be given to the publication that was the source of the principle (e.g., Jonassen, 1994) or the consultation with practitioners.

Table 5: Organising matrix for draft design principles

Draft principles	Source/ Reference
[Condition x] may best be facilitated by learning designs which:	
Draft Principle 1:	
Draft Principle 2:	
Draft Principle 3: Etc.	

Technological affordances

Once the draft principles have been created, it is important to consider the best way to deliver or operationalise the intervention within the e-learning environment. Often the intervention is technology-based, so innovative technologies can be part of the solution. A guiding question could be:

- What technologies appear most useful for operationalising or implementing the intervention?

  Think about technologies that might be useful for the students to use as cognitive tools as well as for delivery of content, for example, computer programs, websites, mobile technologies, and collaborative tools such as wikis.

Once the draft principles have been created, the proposed solution is designed and developed (according to the draft principles) ready for implementation.

The design of the learning environment

When the design principles that will guide the creation of the learning environment are clear, it is important to consider how each will be instantiated in the learning setting. Again, a table can be useful to describe how each of the draft principles will be reflected in practice in the learning environment. Table 6 provides a matrix to illustrate how each design principle can be explicitly stated (in Column 1), and how each principle will be implemented or operationalised (in Column 2)

Table 6: Implementation of draft design principles

Draft principles	Principle will be implemented in the learning environment by:
Draft Principle 1:	
Draft Principle 2:	
Draft Principle 3: Etc.	

By the end of this phase, draft design principles will have been produced, appropriate delivery technologies will have been selected, and a solution to the problem will have been planned and created ready for implementation in the e-learning course.

PHASE 3: Iterative cycles of testing and refinement of solutions in practice

Once a learning solution or intervention has been designed and developed (in Phase 2), the next phase of design-based research is the implementation and evaluation of the proposed solution in practice.

Design-based research is not a methodology, but a research approach. While both qualitative and quantitative methods may be used, it is worth noting that: 'Design researchers do *not* emphasize isolated variables. While design researchers do focus on specific objects and processes in specific contexts, they try to study those as integral and meaningful phenomena' (van den Akker, Gravemeijer, McKenney, & Nieveen, 2006, p. 5).

The first implementation/cycle

The solution designed in Phase 2 is implemented and evaluated in iterative cycles in Phase 3. The iterative nature of design research means that a single implementation is rarely sufficient to gather enough evidence about the success of the intervention and its affect on the problem situation. A typical design research study would have two or more cycles, where after the first implementation and evaluation, changes are made to the learning design to further improve its ability to address the problem. This is in keeping with the focus suggested by Reeves (1999) who maintained that 'our research and evaluation efforts should be primarily

developmental in nature … the purpose of such inquiry should be to improve, not to prove' (p. 18).

The first implementation evaluation is planned in much the same way as any research study, where choice of participants, and data collection and analysis strategies are selected in relation to the research questions. Relevant questions here include:

- Who are the participants in the study?

  Consider the class, the students, any additional researchers or helpers, and so on. Because of the highly situated nature of design-based research, participants in a design research study in education are central to the investigation. As Reeves (2006) noted 'Design research is not an activity that an individual researcher can conduct in isolation from practice' (p. 59). Most often, participants are students in the researcher's (or cooperating practitioner's) own practice, or teachers, parents, support personnel or other people involved in the educational community that is the focus of the study.

- What procedure will be used to implement the solution with the students in the e-learning course?

  Practical steps need to be planned to implement and evaluate the intervention.

- What data will be collected to answer the research questions?

  The method of data collection in design research can involve the collection of qualitative and/or quantitative data, and it may be collected in cycles of several weeks, or even semesters or years. 'In view of the wide variation of possible interventions and contexts, a broad range of (direct/indirect; intermediate/ultimate) indicators for "success" should be considered' (van den Akker, 1999, p. 8). Plan the multiple data sources (triangulation) to ensure that evidence on the success of the solution is collected from different sources. For example, data sources such as:

  - Interviews
  - Surveys
  - Focus groups
  - Anecdotal records
  - Artefacts (or student work)
  - Participant journals
  - Published evaluation instruments
  - Questionnaires
  - Observation
  - Activity logs
  - Usability tests
  - Content analysis
  - Statistical tests

- How will data be analysed?

Specify how data from each source will be analysed. This will depend upon the data types and research design.

Further iterative cycles

After the first implementation of the solution and the analysis of the data, evidence on the success or otherwise of the approach will be collected. A review of this evidence will enable changes to be made to the intervention to improve it. It is important to see this process as an opportunity to continually improve the e-learning strategy rather than to see it as a one-off test of its effectiveness. With the strong foundation of the intervention in theory and practice it is unlikely that the first attempt will be completely ineffective so that it requires the teacher to abandon the approach completely. Instead, the e-learning design is refined and then implemented again. Often the refined second implementation is quite similar to the first but with a different group of students (such as the next time the unit or course runs). The data collected may be the same, or could be modified because of the analysis and findings.

PHASE 4: Reflection to produce design principles and enhance solution implementation

Once a learning design or intervention has been implemented, evaluated and refined in cycles, the last phase is to reflect on the entire process to produce design principles that can inform future development and implementation decisions. There are potentially at least three useful outcomes of design-based research:

- The design principles
- Designed products or artefacts: the physical representations of the learning environment (e.g., website, CD-ROM)
- Societal outputs, such as professional development and learning

Design principles

A distinctive element of design research, and one that sets it apart from other research approaches (such as action research) is the production of design principles to advance both practical and theoretical understanding of the problem area. After the implementation and evaluation of the proposed solution, the draft principles that have guided the design of the solution need to be revisited. After analysis and reflection, revise the principles to reflect the findings. As a result of the findings from Phase 3,

principles may need to be refined, revised, reorganised, combined, reduced, and possibly new principles will need to be added.

Practical output of design research

The intervention that is designed and implemented in design research is often a computer-based or technology-based product that could be published or shared widely. The product of the design is viewed as a major output. However, a less tangible product may be the approach or method used (such as a particular pedagogical approach) rather than a physical one.

Societal output of design research

The collaboration that is so integral to the process of designing and accomplishing a design research project has an additional benefit in that it enhances the professional development of all people involved, not only the students. For example, the project may have involved computer programmers, graphic designers, professional developers and so on, as well as the practitioners, academic colleagues and students involved directly in the study.

Reporting design research

Many teachers and faculty members, especially those working in institutions classified as research universities, recognise but rarely admit publicly, that the primary reason that they conduct research is that they are bound by the publish-or-perish rule, that is, they must publish in refereed research journals or fail to achieve tenure or be promoted. In this regard, publishing design research papers has particular limitations and problems.

Design research is such a new approach to educational inquiry that many journal editors and reviewers are unfamiliar with it. Many reviewers confuse the method with simple evaluations of software, or unfairly emphasise the *development* at the expense of the *research*. In addition, the narrative nature of design research reports means that they often easily exceed the word number limitations of traditional print journals.

Therefore, design researchers must be creative in their efforts to disseminate the findings of their research endeavours. First, we recommend that they regularly present in-progress reports of their design research initiatives at general international conferences as well as at discipline specific conferences. There are several places within the phases of the approach where findings can usefully be shared in conferences. For

example, by the end of Phase 2, a significant educational problem has been identified, the literature has been examined, practitioners have been consulted and importantly, a theory-based solution has been designed—all worthy of dissemination to colleagues at scientific gatherings. There is also the added benefit that peers can give advice and feedback on the proposed solution. Such a paper may not be acceptable at conferences where data analysis is a requirement for acceptance, but many conferences do take brief or in-progress papers where such dissemination would be most appropriate.

Second, researchers could create a project website with regular updates and a series of numbered interim reports of their findings. Additional related resources and links could also be featured on such a website.

Third, from time to time, researchers should submit syntheses of their conference papers and interim reports to both print and online journals. Online journals are particularly appropriate to design research on authentic e-learning as links can be made to the research website or possibly the learning site itself.

Fourth, at the conclusion of a major design research cycle, researchers should seek to publish a book and associated web resource that summarises the methods, results, and design principles emerging from the project. This may sound easy, but it requires a sharply focused attention to dissemination. Such a process is important as it helps to encapsulate the findings of each iterative cycle or stage into a whole and substantial contribution to the educational community, in the form of frameworks or guidelines for others to apply.

A research agenda for authentic e-learning

What questions should be pursued over the next decade to advance the state-of-the-art of authentic e-learning?

There are many practical and theoretical impediments to the widespread use of the approach that have been discussed in earlier chapters that require solutions, such as:

- The difficulty of designing convincing tasks to carry complex and sustained learning
- The role of participatory, social technologies in facilitating the creation and publication of genuine products
- The impact of restrictive administrative and assessment policies in higher education

- The means to reduce the high workload associated with e-learning student support
- The impact of reduced funding and resources for e-learning course development in universities
- The most appropriate means to share authentic e-learning designs
- Restrictions of mandatory use of learning management systems and virtual learning environments
- Potential lack of student engagement (at least initially by some students)
- The means to provide authentic assessment within learning management systems
- The role of motivation in student accomplishment in authentic e-learning

These areas of research in particular provide opportunities to advance understanding about authentic e-learning and to respond to the widespread use of technologies and web-based tools in society generally.

Design research offers a way forward towards more significant and socially responsible research. It requires that researchers in education to:

- Explore significant educational problems, rather than conduct research for its own sake
- Define a pedagogical outcome and create learning settings that address it
- Emphasise content and pedagogy rather than technology
- Give special attention to supporting human interactions and nurturing learning communities
- Modify the learning design until the pedagogical outcome is reached
- Reflect on the process to reveal design principles that can inform other teachers and researchers, and future development projects.

Nonetheless, the dominant mental models of educational technology research must evolve.

Certainly, the need for a more socially responsible research agenda in e-learning has never been greater. Instead of continuing to tinker around the edges of teaching and learning challenges by conducting quasi-experimental studies focused on small changes in learning environments, or even conducting one-off qualitative studies of esoteric cases, instructional technology researchers and their colleagues in other

academic disciplines must begin to tackle the huge problems we face in the first quarter of the 21st Century. Design research offers a positive step in that incredibly important quest.

Conclusion

In reflecting on her role as a university teacher, Hogan (1996) made this observation:

> I was struck by the irony that I did an enormous amount of reading and thinking about education in order to prepare my lectures, plan effective workshops and select readings and texts for my students, while the students did relatively little. I was the most active learner in my classes—because I had total responsibility for what was learned and how it was presented. (p. 79)

Hogan's observation resonates with many teachers and academics who spend hours preparing lectures, classes and online teaching sites for students. Many teachers express the view that they have never truly understood a concept or issue until they were required to teach it. Perhaps it is so with e-learning sites—the teachers or creators have a wonderful time ordering and simplifying concepts, presenting ideas and gathering resources, and the students just 'do' the work. Using an authentic learning approach, the principal responsibility for what to learn and when to learn is no longer the teacher's. Instead, responsibility for learning rests with the learner.

The use of authentic e-learning in higher education has the capacity to reinvigorate online courses through the use of new participatory learning technologies, not only for delivery, but as powerful cognitive tools and publication platforms. It has the potential to renew individual teachers' enthusiasm for their online teaching by challenging them to create innovative and complex tasks that are so carefully crafted, they have the ability to facilitate student learning across a whole semester unit or a large part of it.

Academic staff members are under increasing pressure to design e-learning courses in ways that help students to achieve higher order outcomes such as thinking like experts, being able to accomplish work-related professional roles, and developing robust mental models of complex processes. But most of them are unable to accomplish this without design guidelines and substantial support. This book has been written to provide exactly this type of support.