The Twelfth Cambridge Conference on Open and Distance Learning

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Is eLearning a "disruptive" technology?

James Fleck
The Open University, UK
j.fleck@open.ac.uk

Abstract

This paper is motivated by the difficulties experienced in trying to introduce a particular eLearning initiative, GIMBA, within a conventional university context. It is argued that the constraints, organizational and other, arising from conventional contexts effectively preclude a thorough going implementation of eLearning arising from within that context. They permit only a restricted, incremental implementation that essentially substitutes certain elements of the existing educational system without seriously challenging or "disrupting" the system as a whole. But research in innovation has identified that certain technologies under certain conditions do have the potential to be disruptive.

This paper considers whether eLearning is such a disruptive technology and what this might mean for the development of e-learning and education more generally. First, background on the attempt to design and launch a new eLearning programme at The University of Edinburgh will be provided. Second, Christensen's notion of "disruptive technology" will be explained. Then, with particular reference to this specific case of e-learning, it will be considered whether eLearning is indeed a disruptive technology. Finally, some of the broader implications for eLearning in general will be outlined.

Introduction

In the spirit of action research (Coghlan & Brannick, 2001) this paper was motivated by the investigations for a new eLearning programme, GIMBA (Global Innovation MBA), planned at the University of Edinburgh. The project extended for four years, and was a fairly radical initiative, requiring funding of some £3 million for launch (Fleck, 2002; Fleck & Smith, 2002).

Our experiences in attempting to set up this new programme and to overcome a seemingly interminable series of problems led us to ask: "What *is* the appropriate organizational arrangement for running this new programme?" Can it be done within the traditional university structures? Our struggles called to mind work done by Christensen (1997). He identified a particular set of innovations—"disruptive technologies"—which offer particular problems for established organizations.

Our experiences at Edinburgh

GIMBA (an MBA in innovation, technology and global business development) was a new programme aimed at providing certain professionals with the latest thinking relevant to their working activities. These are people involved in creating value through the introduction of new products and services in the emerging worldwide business environment. GIMBA comprised three elements: First—the distinctive academic programme itself, focused on the creation of value in the global arena. Second—a systematic team-based approach to course development, focused on designing the set of educational activities that students need to undertake in order to acquire a deep understanding of the field. Third—a distinctive approach to course delivery in which students are provided with course materials in a dedicated "Personal Learning Appliance" with key elements of teaching, tutoring and communications effected through the Internet.

Despite appreciating the extensive effort required for implementation, we were astonished at the protracted negotiations that turned out to be required with various University committees and authorities. More than 200 hours of personal interaction with university personnel at all levels were logged. The academic design of the curriculum as a legitimate University of Edinburgh programme (i.e., a set of courses leading to a degree qualification) was achieved (Senatus Papers, 2003).

At this stage the appropriate organizational arrangements became an issue. The key problem was that the University was not geared up (at that time: 2002-5) for running programmes that were *primarily* electronically delivered, as opposed to merely supported by on-campus electronic facilities such as WebCT. The typical electronic approach then involved little more than the electronic delivery of course materials that would conventionally have been given as hard copy handouts. In a few cases, faculty were more adventurous, with the use of multimedia materials (notably in archaeology, where the visual element lent itself to this treatment). The major teaching medium, however, resolutely remained the face-to-face lecture.

Key organizational issues appeared to be: administration; course development and operation; fund raising and cost control; and marketing. A further issue—the provision of the best expertise from wherever in the world on the subject matter—also had organizational implications.

Administration

As in the proposed programme, students' primary access would be electronic, and as they would not in general be personally present, new administrative procedures making a virtue of the total electronic capture of student details and work were ideally required. However, current university office arrangements utilized a mix of partial electronic

systems together with the moving around and filing of pieces of paper and required the personal involvement of the students for matriculation. To make use of existing office facilities, therefore, would require the translation of electronic information into printed form: a retrograde and inefficient additional step. In trials of selected elements of the new design in face-to-face classes making use of the campus electronic systems noted above, we had already run up against this problem. For instance, registering the students actually taking a particular course was a protracted process involving the course coordinator, the student, their Director of Studies, the University Registry and overnight downloads. It would clearly be desirable to devise an entirely electronic version of this process for the full programme, but gaining approval for this approach from the University bureaucracy was not a straightforward matter.

Course development and operation

There was a need for electronic teaching materials to be very carefully designed for presentation and access. This is in contrast to the traditional academic lecturer's variable but generally rather scrappy personal notes. As an ancient university, Edinburgh's course development practice stems from a long tradition of academic authority underpinned by the presentation of traditional text. In essence we were moving from a "craft" model of academic teaching, in which the individual academic takes care of *all* the aspects from deciding course outlines, selecting preferred texts, writing course notes, devising required assignments, to producing the PowerPoint slides and often conducting the tutorials all by themselves. The new eLearning programme made use of a team of specialists including web designers to code the electronic forms presented, graphics people to help design the visual materials, specialist library staff to check the copyright and appropriate use of secondary resources, and so on—the emerging model of good practice in eLearning and, indeed, distance learning more generally, as the Open University's structured approach to course development illustrates (Greenberg, 2003).

Nevertheless, at Edinburgh there was considerable resistance to the proposed move from craft to a professional team. Although *in theory* appropriate support was available through a range of service departments, in practice it proved extremely time consuming and required considerable negotiation. Moreover, there was always a limit imposed by the existing budget structure and the resulting perceived cost constraints. For instance, although academic staff cost some 2 to 4 times as much as a graphics specialist, the latter is an *additional* cost for the respective Department and, therefore, has to be paid for separately. As part of our trials for the new programme, we experimented with some 20 hours of streamed lectures. While the appropriate support unit at Edinburgh was able to provide valuable help, our capacity requirements for actual delivery were well outside their scope. In the event, one of the students on the course concerned came to our rescue: he offered us the use of spare capacity from his own business!

Fund raising and cost control

Even were there no time, access or integration problems over acquiring the appropriate support, the cost implications of the ambitious new e-learning programme went far

beyond existing budgetary capabilities. This meant that additional and extensive external funds were required. Up to that time at Edinburgh, all of the most advanced eLearning initiatives (in the Veterinary School, the Medical School, and in Science) had been funded by external funds from a variety of sources. The amount of external funds required by the new programme and the commercial opportunities it opened up (as a world-oriented MBA) led us to investigate the feasibility of raising external funding via educational venture capitalists.

Not surprisingly, such sources require special arrangements and strong assurances about accountability, governance and organizational identity. These were in tension with the mainstream, traditionally articulated, committee-based and centrally moderated arrangements that prevailed at Edinburgh. To put it bluntly, such sources were unwilling to fund anything run by an academic committee: they wanted designated individuals to whom they could relate, and could hold accountable if things did not go well. There were also tensions over traditional academic versus commercial values, with fears expressed that commercial pressures might compromise the academic standards of the new programme.

Marketing

Another marked difference in the operation of the new eLearning programme from conventional programmes arose from the very different approach to marketing required. Traditional programmes at Edinburgh essentially assumed that marketing was done *implicitly* via UCAS, via general reputation and via posters placed in cognate departments in other Universities. Things were already significantly different in the MBA arena, where a well-elaborated system of programme fairs, league tables and selective, high profile press advertising was the norm. However, with existing MBA programmes, growth is generally organic. New programmes are supported by income generated from existing programmes and growth is consequently only incremental.

With the new programme, because of the involvement of serious external commercial money and significant differences in the nature of the audience addressed, there was a greater need for professional and systematic marketing. We commissioned several market reports to establish basic feasibility and to identify potential competitors. More direct corporate engagement and closer liaison with in-house training programmes appeared to be crucial for enabling the new programme to achieve success. The challenge was how we could be more responsive to the legitimate requirements and preferences of those ultimately underwriting future income streams, while not losing the necessary independence for academic quality. Certain aspects of eLearning are crucially involved: flexibility in timings of teaching and learning; the ability to continue learning despite geographical movements dictated by work demands; and the nurturing of appropriate communities of learners were all key: conventional campus-based approaches were more limited in what they could deliver.

Specialist provision

An important educational aim of the new programme was to mobilize knowledge as soon as possible once it has been generated or validated in research. This would then enable a virtuous interaction between working practice and research activity, to the mutual benefit of both. Once again, this is an immensely attractive goal facilitated by

electronic networking, not only to deliver to a dispersed student body, but also to harness a distributed knowledge supplier base.

This poses specific organizational challenges. We needed to devise terms of participation that were satisfactory to all potential providers (or "academic originators") as well as their home institutions. We needed an organizational form that was adequately robust, especially for quality assurance, and yet transparent to all the participating providers. These requirements were also in tension with prevailing practices at most universities, which favour local control over provision, from personnel to intellectual property rights. The legal intricacies of trying to resolve this were quite astonishing.

Innovation and disruptive technology

The field of innovation studies—the systematic investigation of the factors involved in the development and exploitation of new technologies, products and processes—has grown steadily. It started with empirical research on the roots of successful inventions (e.g., Jewkes, 1958) and developed a theoretical infrastructure drawing on a range of disciplines, notably economics, sociology of knowledge, anthropology and management studies. Recently it has become influential in shaping Government policies and corporate strategy, as evident in the Sainsbury review of innovation policy in the UK (*DTI, 2003*). Insights from innovation are also being employed to inform educational developments, through The Innovation Unit set up by Tony Blair in 2003; for example with the recent paper "A D&R system for education" (Bentley & Gillenson, 2007) which draws explicitly on research in innovation.

Relevant aspects of innovation

Innovation in a specialist sense is recognized as necessarily involving the *exploitation*, usually commercial, of new ideas, way beyond the mere generation of novelty, which is perhaps its more common sense meaning. The economist Joseph Schumpeter, who refreshed the term "entrepreneur" and perhaps inspired its modern cachet, placed innovation at the heart of his theory of episodic and turbulent economic growth. This contrasts with classical economic theories that focus on equilibrium. The phrase "perennial gales of creative destruction" succinctly captured his view (Schumpeter, 1942).

Schumpeter also identified the important distinction between "radical" and "incremental" innovations. He noted, "Add as many mail coaches as you please, you will never get a railroad by so doing" (1935, p.7). Radical innovation implies a complete change in the technological base, from the raw materials, the appropriate knowledge employed, and the industry structures engaged, right through to the eventual products produced. Thus the shift from vacuum tubes to solid-state devices such as transistors has brought about huge changes in how electronic devices and products are made and entirely transformed the basis of the industry.

However, because of the recursive complexity of modern technological products, innovations that are radical with respect to *component* technologies may not necessarily be radical with respect to overall working systems, or *configurations* (Fleck, 1993).

Hence, the shift from cathode ray tube monitors to liquid crystal displays are clearly radical in relation to the television tube industry, changing its entire basis of operation, but not with respect to desk top computers, where they offer merely incremental improvements of power consumption or use of desk space.

Further, with complex innovations, the process of implementation is itself a crucial site for innovation (Leonard-Barton, 1988). In contrast, the conventional "linear model" tends to ascribe most if not all of the key innovative contributions to an early stage of invention or R&D (Grandin *et al*., 2004). A corollary of the creative importance of implementation is that *the contributions of those people engaged in the application and use of the innovation are every bit as important and creative as the contributions of those involved in the production of the initial components of the innovation.* In many cases it turns out that users are the originators of the innovation in the first place (von Hippel, 1988).

"Disruptive technology"

Clayton M. Christensen was concerned with explaining the common pattern in which leading companies, despite all their best efforts, generous investments in research, and paying detailed attention to their customers' preferences nevertheless often failed to make the transition when certain new technologies or innovations came along. In such cases of "disruptive" innovation, new entrants, smaller and less well resourced than the incumbents would grow to achieve eventual market dominance under the new conditions, while the incumbents, despite all their efforts, would be forced into a niche position or out of business altogether—Schumpeter's gales of creative destruction with a vengeance. Christensen verified that this pattern exists, through detailed firm and industry level analyses. These ranged from the hard disk drive industry, the computer industry to such examples as the rise of discount retailing and the displacement of cable-operated excavators by hydraulic equipment. In the computer industry for example, there have been several waves of disruptive development: main frames gave way to mini computers, which in turn gave way to workstations and desktop networks. And in each wave, new firms rose to prominence while previous incumbents failed.

Christensen distinguishes between *sustaining technologies*, which foster improved product performance, and *disruptive technologies*: which, though initially yielding *worse* product performance, offer new features that ultimately change the basis for competition. This differs from the incremental versus radical distinction: sustaining technologies may be either radical or incremental in nature. Established companies could relatively easily accommodate sustaining technologies, both radical and incremental. But disruptive technologies caused them problems.

Crucially, disruptive technologies bring to the market a new value proposition: they offer different features initially valued by only fringe or new customers. However, the rate of technological improvement tends to be far faster than the rate of performance improvement demanded by established markets. Thus, a disruptive technology, though underperforming to start, can rapidly improve to become performance competitive in the longer term. Thus, for instance, companies that once required mainframes for their processing power later found that networks of desk top machines and file servers would suffice. Moreover, these new forms offered considerable advantages in convenience, redundancy and flexibility.

Tellingly, disruptive technologies pose particular problems for incumbent firms already serving a large and demanding established market base. The new technologies (that eventually turn out to be disruptive) tend to offer lower margins, and are therefore intrinsically less attractive to the established firms. Furthermore established customers generally don't initially want and can't use the new features offered, as these do not (initially, at least) suit their existing facilities and working procedures. Consequently, the incumbent suppliers cannot justify investment in the new (potentially disruptive) technology. Instead, the incumbent companies, by the very virtue of carefully listening to their established customers, are driven to seek sustaining technologies that improve the sorts of performance already clearly valued.

But new small entrants are unconstrained by a large and demanding existing customer base. They can therefore target the (initially) fringe markets. They can afford to invest in the new (potentially disruptive) technology. And they are able to explore the range of market opportunities opened up by the new features offered by the technology. If the technology does then turn out to be disruptive, these new entrants find themselves well placed to grow along with the new market opportunities and to exploit the new technology to the full.

Organizational implications of disruptive technologies

The above analysis appears chillingly fatalistic. Consequently, Christensen considered how disruptive technology could be effectively managed, especially by incumbent firms at risk of being threatened. He suggests a set of principles that essentially refer to the appropriate organizational arrangements required to accommodate disruptive development. These add up to the need to set up initially small, highly autonomous, and flexible organisations. These, unfettered by existing practices (especially budgetary arrangements) and market assumptions, can be highly responsive to potential customers. They can also effectively explore the emerging logic of the new technology to the full, thereby generating appropriate competence within the organisation in the new way of operating. But many will fail.

Discussion: Is eLearning disruptive?

It seems clear that eLearning is a radical innovation, promising a complete transformation of the technology base employed. Moreover, Richard A. Lanham of UCLA suggests that in time it might change the entire "operating system" of education and scholarship. He provocatively argues, with particular reference to the humanities, that "digitisation," the move from traditional written texts to the new "expressive surface" of the computer display:

- "affects libraries because it affects books, and in the most intimate way.
- affects, therefore, library buildings and the budgets thereof.
- affects all the issues of intellectual property.
- affects professional specializations and departmental structures and, therefore, university administrative structures at all levels.
- affects "access" in all its aspects, especially in the most profound ones, access to creation and performance of humanistic works, as well as learning about them.
- affects "literacy," literacy programs, and every social impact they exert.

- affects the neural pathways of the brain, and how they are being irreversibly laid down; thus it affects whether students will be able to pursue any intellectual work which requires the higher processes of symbolic thought.
- affects a "class" and how it works.
- affects what a "classroom" is and how it works.
- affects what a "textbook" is and how it works.
- affects the undergraduate "major."
- affects what the undergraduate curriculum will become.
- affects what traditional graduate disciplines will study as well as how they will study it" (Lanham, 1992).

This would appear to be the stuff of disruptive innovation.

However, Lanham's proposed causality has not yet worked its way through. Existing patterns of behaviour and organizing persist despite the potential for change. Moreover, eLearning is intrinsically configurational as defined above: there is complete freedom to select specific elements of e-learning and use them in different ways. So multi-media CD-ROMs can be employed as self-help educational programmes that the individual works through in their own time. They can also be used as support materials, as "computer clips" in a face-to-face class. Similarly, Learning Management Systems may be used *either* as the main vehicle for delivering teaching, *or* merely as a means of providing handouts for an on campus face-to-face class. Thus, many of the components of eLearning can be exploited to enhance current practices and provision. They can also be used in an incremental fashion, with only a step-by-step adoption of the facilities available in learning management systems like WebCT.

Hence, though eLearning may be *potentially* disruptive, in actual practice many possible configurations will be used to *sustain* existing provision, especially for on campus face-to-face teaching. Other configurations of eLearning may be used to sustain existing distance learning operations, perhaps by replacing the physical delivery of course materials by electronic downloads.

The GIMBA Programme

GIMBA comprised a distinct configuration of eLearning. Most of its components were generic: The programme made use of a variety of multi-media materials from providers such as Pearsons, as well as purpose-developed segments. The strategy was to integrate proven elements from suppliers, reserving design effort for elements that were key to competitive distinctiveness, such as a distinctive navigational approach based on proprietary mind mapping software.

However, we were addressing a new and very distinctive market: highly ambitious, highly mobile professionals involved in the development of innovations, primarily though not exclusively in larger firms: in short, active practitioners involved in the business of value creation. The conventional face-to-face full-time approach cannot adequately address this specialist market with very particular needs. In this lie the possible seeds for a disruptive approach.

Conclusions: The implications for eLearning

First, eLearning has an intrinsically configurational character and therefore will be manifested in an almost limitless variety of specific ways: no one "killer app" is likely to emerge.

Second, due to this "horses for courses" character, the role of educational users will continue to be of creative importance. Educators should recognise this and think about how they can contribute their ideas and experience to develop new eLearning configurations. We should not abdicate responsibility for development to technical or other specialist suppliers.

Third, while eLearning is undoubtedly radical in technology terms, because of its configurational range, many applications will be used in a sustaining rather than disruptive fashion in Christensen's sense, and will enhance existing offerings, especially in the short term on the campus.

However, some initiatives making more extensive use of the palette of eLearning facilities are likely to prove to be disruptive, *especially where they are autonomous from conventional educational establishments and therefore free to discover new markets and to develop new competences.* These disruptive developments may well eventually bring about major overall changes in education.

References

Bentley, T. & Gillenson, S. (2007) *A D&R system for education*, The Innovation Unit, London.

Christensen, C.M. (1997) *The Innovator's Dilemma: When new technologies cause great firms to fail,* Harvard Business School Press, Cambridge MA.

Coghlan, D. and Brannick, T. (2001) *Doing Action Research in your Own Organization*, Sage Publications, London.

DTI (2003*) Innovation Review* See: http://www.dti.gov.uk/iese/innovationreview.htm

Fleck, J. (1993) Configurations: Crystallizing Contingency, *International Journal on Human Factors in Manufacturing 3 (1)* 15-36

Fleck, J. (2002) *Proposal for a new e-learning MBA in Innovation, Technology and Global Business Development (the GMBA Programme)* The University of Edinburgh, October 2002.

Fleck, J. and Smith, E. (2002) *The Global MBA (GMBA) Business Plan,* The University of Edinburgh, May 2002.

Grandin, K., Wormbs, N. and Widmalm, S. (eds.) (2004) *The Science-Industry Nexus: History, Policy, Implications.* (Nobel Symposium 123) Science History Publications/USA., Sagamore Beach MA. pp.229-255.

Greenberg, J. (2003) (Director of Strategic Development, Learning and Teaching Solutions, OU) e-learning in the Open University: challenges for the next 10 years, *Open Meeting on e-learning at the University of Edinburgh*, March 2003.

Jewkes, J., Sawers, D. and Stillerman, R. (1958) *The Sources of Invention*, Macmillan, London.

Lanham, R.A. (1992) "The Implications of Electronic Information for the Sociology of Knowledge," *Conference on Technology, Scholarship, and the Humanities: The Implications of Electronic Information*, Arnold and Mabel Beckman Center of the National Academies of Sciences and Engineering Irvine, California.

Leonard-Barton, D. (1988) Implementation as Mutual Adaptation of Technology and Organization, *Research Policy 17* 251-267
Nobel Symposium (2002) *Science and Industry in the 20th Century: Beyond the Linear Mode*l, Stockholm 21-23, November.
Schumpeter, J. (1935) The Analysis of Economic Change, *The Review of Economic Statistics*, May.
Schumpeter, J. (1942) *Capitalism, Socialism, and Democracy,* Harper and Row, New York.
The University of Edinburgh (2003) *Senatus Papers, January 2003.*
The University of Edinburgh (2003) *e-learning strategy paper, May 2003.*
von Hippel, E. (1988) *The Sources of Innovation,* Oxford University Press, Oxford.

Instructional effectiveness and adoptability of multimedia instructional modules in e-learning

Nanda Ganesan,
California State University, Los Angeles
nganesa@exchange.calstatela.edu

Abstract

A multifaceted model was developed for implementing e-learning in a largely commuter campus. The objective of the model was to create a flexible learning environment that benefitted from the strengths of in-class learning and the accessibility of online learning. One of the effective components of the model was the multimedia instructional modules developed to enhance the learning experience of the students. Several different types of modules were developed, consisting of chalk-and-talk type of lectures, PowerPoint presentations, interactive and non-interactive software tutorials and quizzes. The design methodology and the technology used in the development of the multimedia modules are discussed in this paper. In particular, the discussion is centered on incorporating the in-class learning experience in the modules and on facilitating the rapid development of the modules.

Introduction

The introduction of e-learning in selected Information Technology courses started with the development of multimedia instructional modules. The modules were initially being developed using hardware and software technologies that by any comparison of today's standards should be termed as limited in functionality and features. With the maturing of technologies, a multifaceted model for the implementation of e-learning was conceived and implemented (Ganesan, 2002). The model consisted of three major components.

The first component was the course websites developed to disseminate course related information. The second component was the multimedia instructional modules designed to enhance the learning experience of the students. The third component was a cyber lab built to facilitate the completion of the lab assignments over the Internet. The objective of the model was to build a learning environment that would combine the strengths of traditional learning with the flexibility of online learning. Recent advancement in hardware and software technologies has made it feasible for the proven teaching techniques used in the traditional classrooms to be incorporated in e-learning modules. Moreover, the Internet now offers the opportunity to create a flexible learning environment by overcoming the time, space and resource limitations experienced by students in a traditional learning environment.

In the ensuing effort to build an effective and flexible learning environment, the development of the course websites and the multimedia modules was pursued further without hindrance. The efforts devoted to the implementation of the cyber lab, however, had to be curtailed due to security restrictions imposed on the network resources at the campus. The course websites evolved significantly to become an essential and integral part of instruction. As the websites evolved, the format of the websites became simpler

and purpose oriented, based on the notion that the course websites were intended to educate and not to entertain the students. Only essential and frequently accessed information was hosted on the websites, thus making them efficient and student-friendly.

The multimedia modules also went through similar stages of development. They have now become an integral part of higher learning due to their effectiveness in enhancing the learning experience of the students. The effectiveness can partly be attributed to the ability of the multimedia modules to address diverse learning styles of the students (Montgomery, 1995). Overall, the students were found to be receptive to the introduction of the multimedia based approach to learning, as observed elsewhere (Jereb & Smitek, 2006). The factors that contributed to the successful development and deployment of the multimedia modules are the subject of this paper. In particular, the tools and techniques used for incorporating the in-class learning experience in the modules and the technology now available for facilitating the rapid development of multimedia modules are discussed in the following sections.

Early Development of Multimedia Instructional Modules

Initially, a twin track approach was chosen for the development of the multimedia instructional modules. The first track focused on the theoretical and the second track on the practical contents of the courses taught. At the time the modules were being developed, PowerPoint based lectures had firmly rooted themselves as the primary method of instruction across campuses. The use of PowerPoint presentations in classrooms received positive reviews as well (Frey & Birnbaum, 2002 & Lawry, 1995). The instructor's edition of many textbooks came bundled with PowerPoint slides to teach the courses. As a result, the multimedia modules intended to cover the theoretical component of a subject largely focused on capturing PowerPoint based lectures. This approach was pursued at that time without fully understanding the unsuitability of lengthy PowerPoint lectures to teach college courses.

As far as the practical or the lab component of a subject was concerned, the multimedia modules were designed to capture and demonstrate the functionality of software packages in real-time using a screen capture program. An example in this case would be a software demonstration showing the installation of a new device on a computer. The multimedia modules were found to be very effective as software tutorials. They were able to visually demonstrate the functionality of application software in real-time. The audio explanations included with the video demonstrations provided the students with the necessary information to comprehend the tasks being demonstrated on the screen. As a result, these modules were observed to be significantly better than textbooks in explaining the functionality of application software.

Improving Effectiveness and Adoptability

Although the modules made significant inroads into enhancing the learning effectiveness and adoptability of the modules, there was still room for improvement in several fronts. First, the PowerPoint lectures modelled in the modules were found to be uninteresting to the students. The lack of stimulation in the learning modules was attributed to the absence of chalk-and-talk type of explanations that often supplemented PowerPoint based lectures given in classrooms. As a result, the PowerPoint based

multimedia modules were able to offer only incremental improvement over a clearly and concisely written textbook. Second, depending on the length of the modules, the duration of certain multimedia modules was observed to have a negative influence on the attention span of the students. For example, the longer modules often resulted in the students not being able to stay focused on learning for extended periods of time while watching the modules. A third element contributing to the lack of effectiveness was the absence of interactivity in the modules. Interactivity is considered to be a major strength of multimedia instruction, allowing the students to engage in active learning (Stemler, 1997).

While learning effectiveness is an important consideration from a student's perspective, ease of development and deployment of the modules are factors that are equally important considerations from an instructor's point of view. The insufficient processing power of the hardware and the inadequate features supported in the authoring software in the past contributed to lengthy development time and steep learning curves. Both deterred the instructors from developing and deploying multimedia modules in the classrooms. The feasibility of designing and using the modules must, therefore, be balanced against the primary objective of improving the effectiveness of the modules. A balanced approach to the design of the modules is important for them to be successfully developed and deployed. The design methodology and the development technology that are discussed in the following sections are presented within this context of maintaining a balance between effectiveness and feasibility.

Multimedia Module Formats

A survey of hardware and software was conducted to identify a suitable platform for the development of multimedia modules. The survey focused on technologies that would facilitate the rapid development of multimedia modules. The details of the survey are currently being reviewed for publication in a journal. Using the hardware and software identified by the survey, five different types of multimedia modules were produced with the objective of improving the overall learning effectiveness and adoptability of the modules. The modules produced could functionally be classified as follows.

- Chalk-and-talk lectures simulating the in-class learning experience
- Short PowerPoint lectures providing summary or introductions
- Software tutorials with narration
- Software tutorials with annotated explanations
- Interactive software tutorials requiring input from students

The first type of multimedia modules listed, namely the chalk-and-talk type of lecture modules, were produced using Camtasia (Smith & Smith 2007 & TechSmith 2007). The Seiko InkLink digitizer was used for emulating an electronic whiteboard in this case (Frey Chuck, 2002). The screen activities, along with an audio narration, were recorded using Camtasia to simulate the lectures given in a classroom. A screenshot of a video frame from a module produced in this manner is shown in Figure 1. The simulated chalk-and-talk type of lectures were found to be far more effective than the static PowerPoint based lecture modules in most cases. The exception was in the case of short lectures dealing with overviews and summaries. As such, a few modules representing introductions and summaries were produced based on short PowerPoint presentations. They were listed earlier as the second type of multimedia modules produced.

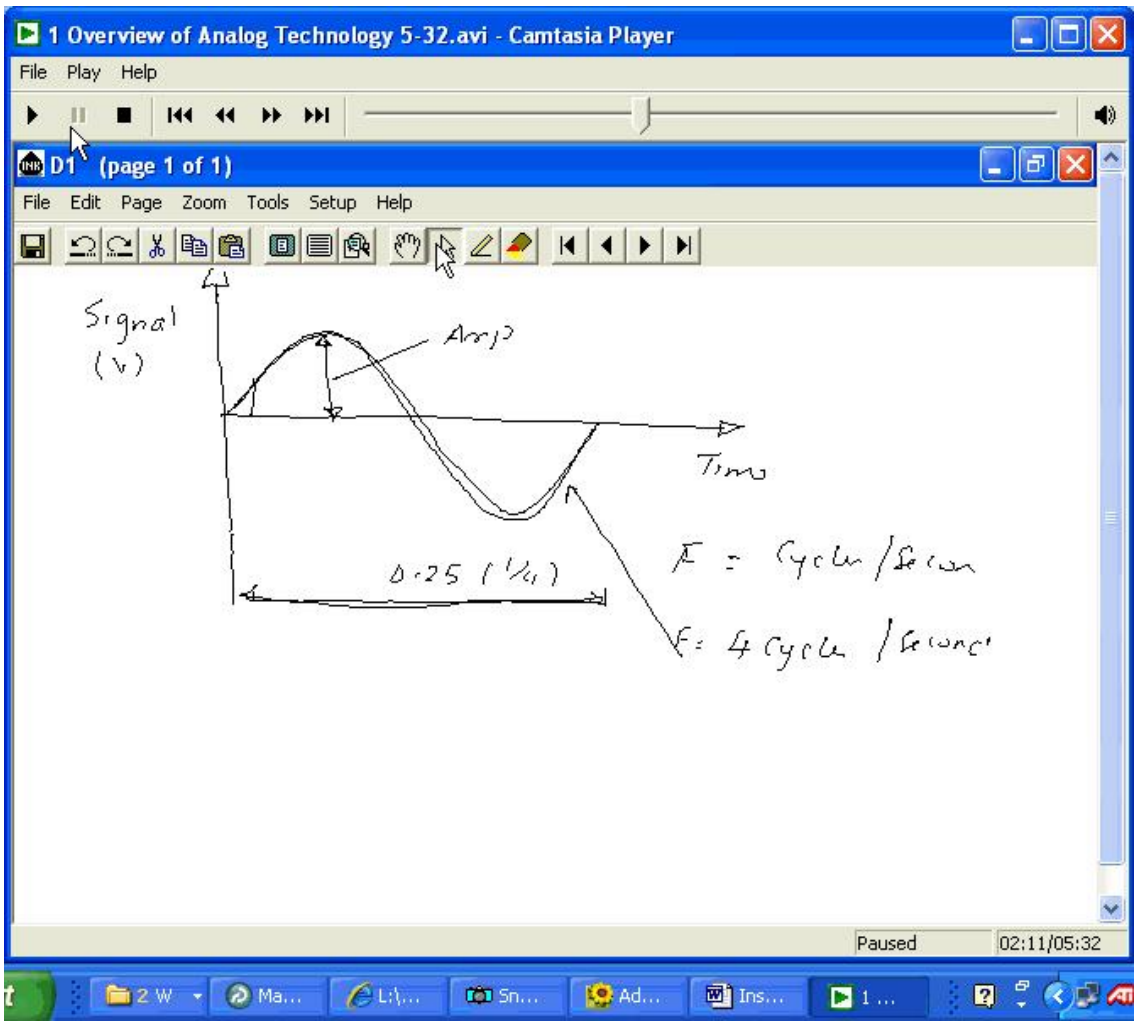


Figure 1. Screenshot from a Chalk-and-Talk Type of Multimedia Module

The third type of multimedia modules produced were passive software tutorials. The reason for addressing them as passive tutorials is because they do not involve interactive learning. The passive tutorial modules were produced using Camtasia by recording the screen activities in real-time along with an accompanying narration. To produce similar tutorials but with annotated text in place of the accompanying audio explanation, the Captivate tutorial authoring software was used. Captivate automatically created and inserted the annotated text while recording the screen activities (Adobe, 2007). Figure 2 shows a sample screenshot containing an annotated text. In this case, the student is guided by the instruction displayed on the screen to select the "Manage" option from the list of options shown in the drop-down menu. The passive software tutorials with the annotated texts were earlier listed as the fourth type of modules produced.

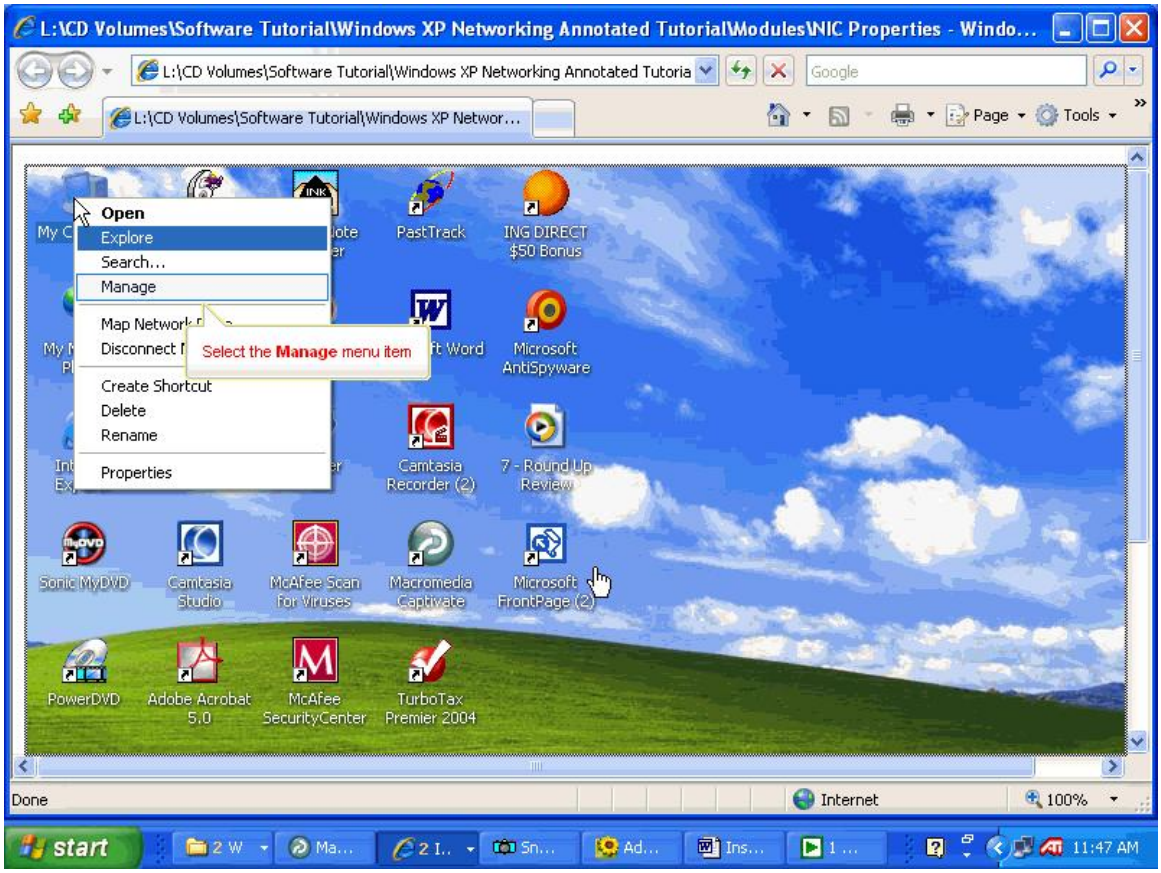


Figure 2. A Sample Screen Image from a Software Tutorial with Annotated Text

The fifth type of modules produced was the interactive software tutorials. They were produced using Captivate. These software tutorials require input from the students at each stage of a tutorial session. The students are allowed to proceed to the next stage only if the correct input is given by them at each stage. If not, an error message is displayed guiding the students to the correct course of action to pursue. In this type of software tutorial, the execution of the application software is simulated without actually having to have the software running on the computer.

A somewhat different approach was taken to implement interactive learning in the lecture modules. In this case, multiple-choice questions were inserted at regular intervals in the lecture modules. The students were required to answer each of the questions before being allowed to proceed to the next section of the learning module. Camtasia supports the incorporation of quizzes in the lecture modules. If needed, questions could also be inserted in software tutorials using Captivate. The quizzes can be scored and the results displayed at the end of a learning session to provide the students with feedback. The scores could thus be used for assessment purpose as well in a course.

Effectiveness of Multimedia Modules

One of the advantages of producing and using the different types of multimedia modules was that the instructor is given the unique opportunity to observe his or her method and style of teaching by watching and listening to the modules. In addition, as

in the case of traditional lectures, the instructor also has the opportunity to interact with the students to obtain their feedback on the effectiveness of the modules. Elaborate methods have been proposed to evaluate the effectiveness of multimedia modules (Kennedy, Petrovic, Keppell, 1998). Although an objective assessment of the effectiveness of the newly created modules was in order, an initial subjective assessment was carried out at this stage by obtaining an early feedback on the effectiveness of the modules from the students. In this respect, the following inferences were made concerning the effectiveness and adoptability of the modules.

- The multimedia modules that were based purely on PowerPoint slides were found to be useful only for short lectures. They were best suited for presenting overviews and summaries.

- The chalk-and-talk type of lectures were found to be the most effective method of capturing and presenting regular lectures delivered in the classrooms. They were, at times, supplemented by information retrieved from the Internet and displayed on web pages within the modules.

- Software tutorials with the accompanying narration were observed to be one of the best methods of teaching the various functional features of application software. They continue to be used as the preferred mode of instruction in software tutorials.

- Software tutorials with the annotated texts were also noted to be effective in teaching the functional features of application software. In this case, however, the students were required have an initial understanding of the features of the software package in order to fully benefit from the tutorial.

- Software tutorials that require input from the students were intended to engage the students in active learning. In spite of this advantage, these simulations were not considered to be the best method of software instruction, especially when the students were noted to have limited prior exposure to the functionality of the software packages.

- Quizzes were included in the modules to promote active learning and learning assessment. However, the incorporation of quizzes in general was found to be a time consuming operation. To overcome this drawback, the questions were posted on the course website for the students to download and read them prior to watching the multimedia modules.

Conclusion

This study on improving the learning effectiveness of the multimedia instructional modules lead to several informal findings. First and foremost, it confirmed the value of the age old practice of using the chalkboard for explanations as one of the most effective methods of teaching. Second, it asserted the need for the multimedia modules to be simple. Third, it drew attention to the fact that the instructors should be able to readily and rapidly develop the modules in order for the modules to be successfully developed and adopted for use in classrooms.

Fourth, the study highlighted the emergence of powerful software and hardware technologies that no more hindered the creativity of the developer in designing and producing effective multimedia modules. The effectiveness of the modules is now dependent largely on the module developer's creativity and teaching ability. Fifth, the study brought to light the importance of simulating the in-class learning experience in the modules.

All five issues discussed are factors considered to be important for the successful development and deployment of multimedia instruction modules. It should, however, be noted that the methodology, technology and the issues discussed in this paper apply to a hybrid learning environment composed of both in-class learning and online learning. The issues to be addressed may be different if the learning modules were to be designed and produced strictly for online learning, such as for the purpose of distance learning.

In a college environment, success in implementing online learning lies in using online learning as a tool to enhance in-class learning instead of attempting to use it as a substitute for in-class learning (Debevec, Shih & Kashyap, 2006; Peat, Franklin, Lewis & Sims, 2002). The term technology assisted learning or hybrid learning as opposed to distance learning would therefore be a better descriptor of the development efforts discussed in this paper. This important distinction is crucial to the success of e-learning in colleges until the present Internet savvy generation evolves to become fully independent and confident in pursuing a pure form of online learning.

References

Adobe (2007) Adobe: Take a Tour of the Adobe Captivate Features. [Online] Available: http://www.adobe.com/products/captivate/productinfo/features/

Debevec Kathleen, Shih Mei-Yau & Kashyap Vishal (2006) Learning Strategies and Performance in a Technology Integrated Classroom, Journal of Research on Technology in Education, 38(3), 293-307.

Frey Barbara A. & Birnbaum David J. (2002) Learner's Perception on the Value of PowerPoint in Lectures, ERIC, 1-10. [Online]. Available: http://eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/27/9f/b3.pdf

Frey Chuck (2002) Seiko InkLink Handwriting System Enables 'go-anywhere" Creative Sketches. [Online]. Available: http://www.innovationtools.com/Tools/SoftwareDetails.asp?a=65

Ganesan Nanda (2002/3) A Multifaceted Approach to Technology Mediated Learning, Journal of Educational Technology Systems, 31(2), 157-176.

Jereb Eva & Smitek Branislav (2006) Applying Multimedia Instruction in E-Learning, Innovations in Education and Teaching International, 43(1), 15-27.

Kennedy Gregor, Petrovic Tom, Keppell Mike (1998) The Development of Multimedia Evaluation Criteria and a Program of Evaluation for Computer Aided Learning, ASCILITE98 Conference Proceedings, New South Wales, Australia, 407-415.

Lowry Roy B. (1999) Electronic Presentation of Lectures – Effect Upon Student Performance, University Chemistry Education, 3(1), 18-21.

Montgomery Susan M. (1995) Addressing Diverse Learning Styles Through the Use of Multimedia, Proceedings of the Frontiers in Education Conference 1995, Volume 1, 373-381.

Peat Mary, Franklin Sue, Lewis Allison & Sims Rod (2002) Staff and Student Views of the Usefulness of Information Technology Materials within an Integrated Curriculum: Are these Educational Resources Effective in Promoting Student Learning?, Australian Journal of Educational Technology, 18(2), 471-480.

Smith Lon A. & Smith Elizabeth Turner (2007) Using Camtasia to Develop and Enhance Online Learning: Tutorial Presentation, Journal of Computing Sciences in Colleges, 22(5), 121-122.

Stemler Luann K. (1997) Educational Characteristics of Multimedia: A Literature Review, Journal of Educational Multimedia and Hypermedia, 6(3/4), 339-359.

TechSmith (2007), Camtasia Studio Learning Resources. [Online] Available: http://www.techsmith.com/learn/camtasia/default.asp

A case study of a new kind of teaching approach for China's open education: professional software as the 'Course Engine'

Guliang Gu
Ning Chen
China Radio and TV University
Guliang@crtvu.edu.cn, Gulianggu@tom.com

Abstract

There are two common kinds of difficulties for an Open University in offering courses in the Science and Technology field - students are usually weak in mathematics skills and there are difficulties in the high costs and inconvenience of doing traditional laboratory work. This paper presents a new kind of teaching approach for distance study students to overcome the above difficulties to some extent. Professional software has been introduced in the textbooks directly as the "Course Engine" to do calculation tasks easily and to enable taught knowledge to be used more practically. This teaching approach is also used for "virtual experiments" replacing some real laboratory work. The approach is very suitable for distance study students who have particular vocational backgrounds and was approved by the China Employment Training Technical Instruction Center of the Ministry of Labor. A detailed example is given as an appendix.

China National Open University, namely China Radio and TV University, is a successful Open University and is also one of the biggest Universities of the world in student numbers. Until recently, over 27 years, the total number of graduates has reached about 5 million. In the last ten years, we have made great progress in many aspects, especially in the application of new technologies in learning and teaching. In the field of Science and Technology, we have offered several hundreds of courses in the fields of Information and Communication, Electrical Engineering, Mechanical Engineering, and Civil Engineering, etc. However, as with many Open Universities, we have been facing many common difficulties in offering some "difficult courses", which require the students to master a high level of mathematics. In China, we mainly meet the following difficulties. Accordingly, some new course designing approaches with high technologies have to be developed.

Most students are not good at mathematics, mainly because it is a long time since they left school, and this creates difficulties when they start new courses requiring maths knowledge. For example, when some traditionally designed courses are presented to distance learning students, it might be very difficult for them to follow the steps of the formula's derivations if those involve somewhat deep maths knowledge. Helped by some cleverly designed multimedia materials, such as well-designed courseware in CDs, this difficulty can be reduced to some extent. However, if a distance study student meets these difficulties, it is very hard work for them to ask help from their tutors either by telephone or by email. The more difficulties they face with unsolved problems, the fewer of them wish to keep studying further.

In many cases, the distance teaching mode is weak in doing laboratory work, for this requires suitable locations, expensive instruments, qualified tutors with skills, and also requires students to pay the relatively high fee.

Mainly for the above reasons, it is apparent that high retention rates for students in the field of Science and Technology is not an easy task for Open Education. New practical and effective new teaching approaches are required using new techniques to meet the challenge.

To use professional software directly in some scientific courses is a practical way to raise student interest, reduce calculating difficulties and to promote their professional skills. For example, a piece of software 'MathCAD' was formerly taught as a kind of auxiliary tool for maths course teaching, to raise students' interests in the Open University UK. However, at present, it is rare for Open Universities directly to introduce this kind of professional software in their formal textbooks as part of the essential contents, but only as some auxiliary tools for data analyzing. Sometimes, a little bit confused, students will ask the question: "I manage to learn the software; indeed the calculation tasks become easier, but what is the purpose of the course, to teach the knowledge or the software? How about our study burdens, one burden or two burdens?"

We, the China National Open University, made some trials in taking professional software as a "Course Engine", to be included in some courses as an essential content. And this teaching way generates a new kind of approach for course design. Some features are described below.

The software plays a key role, not only as the auxiliary or optional part of the textbook. The students do not have to have the double burdens of both studying the traditional knowledge and the software simultaneously. In our new textbooks, the taught knowledge and the software are well organized and merged together. Most key or formal examples are calculated directly by the software, giving clear and deep impressions of data, tables and graphs, which closely link to the key knowledge to be explained (see details in appendix). That is our new teaching approach—professional software is directly taken as the "Course Engine". In this way, the main focus of the teaching will be directed like this: "What is the meaning of this concept?", "What is the physical and engineering background of the concept?", "What are the relative conditions of the formula for solving the problems?" and "How to explain the calculated results or graphs?" etc. At this stage, the students will concentrate their efforts on the fundamental concepts and useful knowledge, but leave the complicated and tedious numerical jobs to be done by the software. Briefly, difficulties in study are reduced and, at the same time, students can also master the essential parts of key knowledge which will be useful for their vocational jobs.

Having mastered the skills of using the software, the students can be organised to finish partial laboratory work by means of the professional software, namely the "virtual experiment". The high costs of laboratory work will be reduced, and also distance study students will have many choices for carrying out the experiment by themselves at any place, for instance at home.

Our China National Open University trialled our new teaching approach in some courses such as Circuit Analysis, Analogue Circuits, Digital Circuits and Project Design in electronics, etc. We achieved our original purposes:

(1) Truly reduced the difficulties of tedious calculating tasks originally done by hand or by calculators.
(2) Really promoted the student's interest in study, both because of the software's practical functions and the key roles of helping students to finish homework.
(3) Actually reduced the cost of laboratory work by "virtual experiments".
(4) Cultivated the students' vocational ability for directly using the professional software in their practical jobs.

Our new teaching approach gained a high evaluation from our National Academic Organization and the China Employment Training Technical Instruction Center of the Ministry of Labor. Now a big Certificate Project to master the professional software is being promoted through the country, to promote learners' vocational skills by our e-learning courses.

Several considerations were of importance when we started our new teaching strategy:

- The students enrolled in our China National Open University are mainly divided into two parts, for the diploma and for the foundation degree. Our new teaching strategy is mainly suitable for the former because most of them want to get practical vocational skills for their daily jobs. To master a practical skill by using a piece of professional software for their vocations is more important than to understand theory thoroughly; to realize the meaning of a physical model in engineering, to quickly get calculating results, and to correctly explain the phenomenon of experiments are more important than to master the skill of deriving a formula.

- When the software is chosen as the "Course Engine", it should meet the requirements of both having all analysis functions for the courses and also having practical functions for professional uses—it should contain enough industrial elements or models for engineering tasks.

- In distance teaching, multimedia, e.g. CDs can be attached to the printed textbooks. In those CDs, many practical engineering problems and the simulation results by the software can also be presented for student self-study at their own convenience.

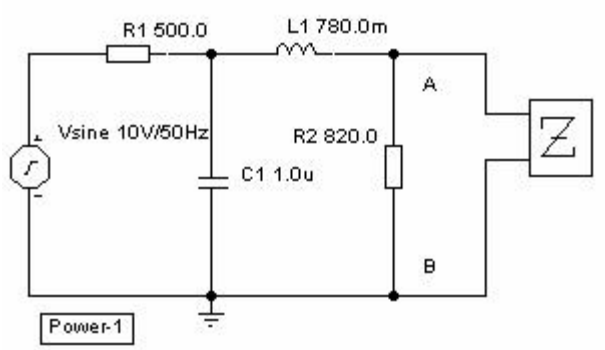
- Virtual laboratory work is very suitable for distance study students. The simulation results might be in any forms of output data, tables and vivid graphs. The key point is that virtual work should meet the needs to replace some traditional laboratory tasks. Our experience shows that the virtual laboratory is especially suitable for "the Principle Stage" experiments, in which the results generated in real experiments and by the software should be almost the same. Furthermore, virtual laboratory work can be further developed to be applicable to some complicated engineering tasks. Simulated results should be almost the same as the real models, provided that the software models approximate the engineering models in most main parameters.

Reference

Gu Liang and NingChen. TINA Pro: A Software Package for Electronics and Information Technology Professionals. Distance Education In China, NO.11 Nov 2002 (Serial No.190), WWW.DLS777.COM, WWW.LONSEA.NET

Appendix

An example, the application of the new teaching approach is given below, to show how to use the software directly as the "Course Engine" in the course of Circuit Analysis.
In the following figure, "Power-1" shows a steady sinusoidal circuit; with the amplitude of the sinusoidal power is 10 volts, 50 Hz in frequency. Try to calculate the value of the complex resistance of Z, in the condition of getting the maximum effective power on it; and then calculate the value of the power.



In traditional teaching, a calculator with function of complex number should be used to solve this kind of problem by hand. The calculating procedure is very complicated for the "Open Study" students who are usually not good at maths. A more unfavourable aspect is that the students usually spend all their efforts on the tedious numerical tasks but omit some more important key knowledge such as how to establish a correct circuit model, etc.

Here, we present our new teaching approach by directly using the software, and this will be identified immediately that the solving procedure is very clear and succinct.

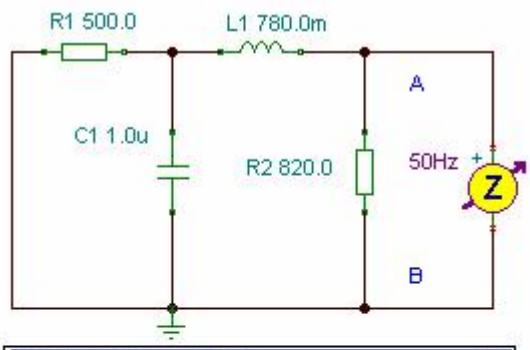
Step 1: Explain the Thevenin theory, which deals with the equivalent and the maximum complex power condition.

Step 2: Use the professional software directly as shown in the figure "power-2", and by the model and the software, the Thevenin's equivalent Complex Resistance of Zo =314.3+j65.11Ω is calculated directly.
At this stage, the attention of teaching should focus on how to establish the correct circuit model but leave the complicated procedure of calculation to be done by the software.

Step 3: By the modified circuit model, use the software again, and obtain the effective voltage value of U_{AB} = 4.34V.

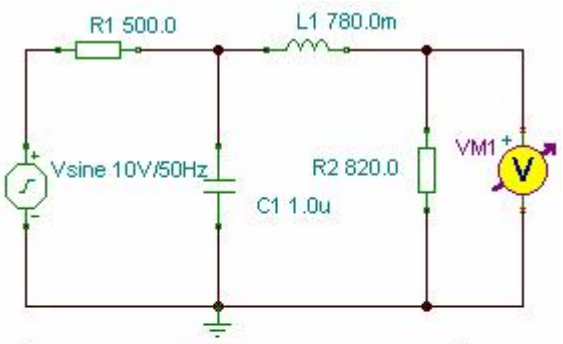
At this stage, the students can also check the result by the formula of
Effective Power = $(U_{AB})^2/(4R_L)= (4.34)^2/(4\times314.3)=14.96$mW

That is an estimated value of the formula.



Nodal Voltages/Meters	
Amplitude	320.97 Ohm
Phase	11.7°
Complex resistance	314.3 +j* 65.11 Ohm
Amplitude	3.12mS
Phase	-11.7°
Complex admittance	3.05m +j* -631.97uS

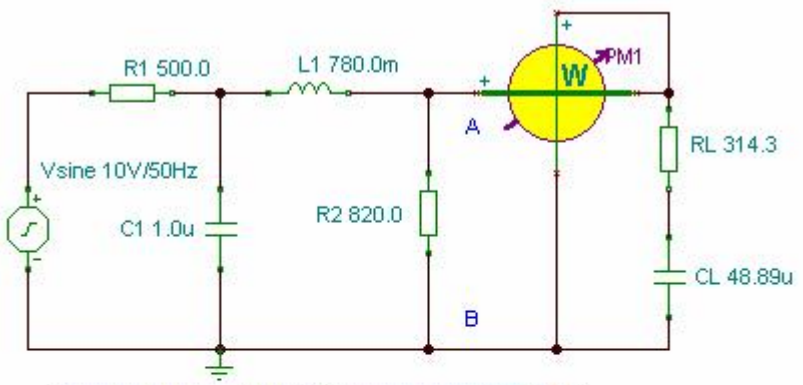
Power-2



Nodal Voltages/Meters	
rms	4.34V
DC Level	0.0V
Amplitude	6.14V
Phase	-106.26°
Complex voltage	-1.72 + j* -5.9V

Power-3

Step 4: At the final stage, the students should understand how to get the complex resistance of Z=314.3-j65.11Ω from the reference steps 2. Furthermore, by the established model of "Power-4", the software is to be used for the third time to calculate the effective power, which shows 15.01mW, very close to the estimated value from the steps 3.



Nodal Voltages/Meters	
Effective power (P)	15.01mW
Reactive power (Q)	-3.11mvar
Apparent power (S)	15.33mVA
Phase	-11.7°
Power factor (cos(fi))	979.0m

Power-4

Blended animated teaching

Massoud Hajsadr
City of Sunderland College
massoud.hajsadr@citysun.ac.uk

Abstract

Blended Animated Teaching (BAT) is a complete online blended teaching solution comprising conceptually itemized schemes of work, tutor like teaching objects and practical classroom pedagogy. Using BAT, students' learning experience of Programming Concepts at City of Sunderland College was noticeably improved.

In class, BAT requires an overhead projector and a simple sound system. By interacting with students, the conducting lecturer prepares the students, then plays the animated lessons and assesses students' understanding via a range of online activities or exercises.

Online availability of BAT, which had been used as the backbone of our blended teaching pedagogy, provided our learners with extra flexibility, better class interaction, attractive teaching material, learning continuity, resource standardization and full time alternative support and hence helped us deal with differentiation more efficiently and increase learner engagement.

Introduction

At City of Sunderland College I have used a special blend of technology enhanced teaching material and classroom teaching pedagogy to improve the leaning experience of HND/C students in learning Programming Concepts which had been noted as a teaching bottleneck (Sayers et al, 2004, Scott, 2004, Koper et al, 2004, Boyle, 2005).

In this paper, the concept and makeup of Blended Animated Teaching (BAT) are described, the rationale behind its design and development is explained, its classroom deployment is attested and findings are reported.

What is Blended Animated Teaching?

The phrase blended teaching/learning has been used to describe approaches which include a mixture of online and face-to-face activities (Rothery, 2004), solutions that combine different delivery modes such as video, computer aided teaching software, web-based courses, etc. (Valianthan, 2002) or simply a combination of pedagogic approaches (Oliver and Trigwell, 2005). However, after many case studies, there isn't yet any evidence of a workable blended classroom teaching pedagogy (Bonk, 2006).

In a study about learners' experience from blended approaches, their success was suggested to depend on the selection and organization of resources and the way they are integrated into classroom teaching (Higgins, 2003). The degree of integration determines how effectively blended resources are used and, in turn, their rate of return on investment.

Blended Animated Teaching (BAT) is a web based teaching resource that with its teaching pedagogy renders the greatest possible resource integration into classroom teaching and activities. It contains a number of web pages, each of which delivers meaningful wholes. This is in accordance to Hilgard's cognitive theory of teaching principles where it is suggested that the organization of knowledge should be from simplified wholes to more complex wholes (Knowles et al, 1998).

In BAT, the teaching objects (Boyle and Jones, 2005) are organized in a strictly backward relating manner. This means that any teaching object might, if needed, only refer to concepts of teaching objects before it. Together the teaching objects make up the scheme of work and act as the backbone for BAT's classroom teaching pedagogy. Figure 1 shows the backbone of BAT as a stack-pile of teaching objects from simple at the bottom to complex at the top. This backbone plays a central role and contains all the information for teaching of a subject inside a fully accessible e-learning resource.

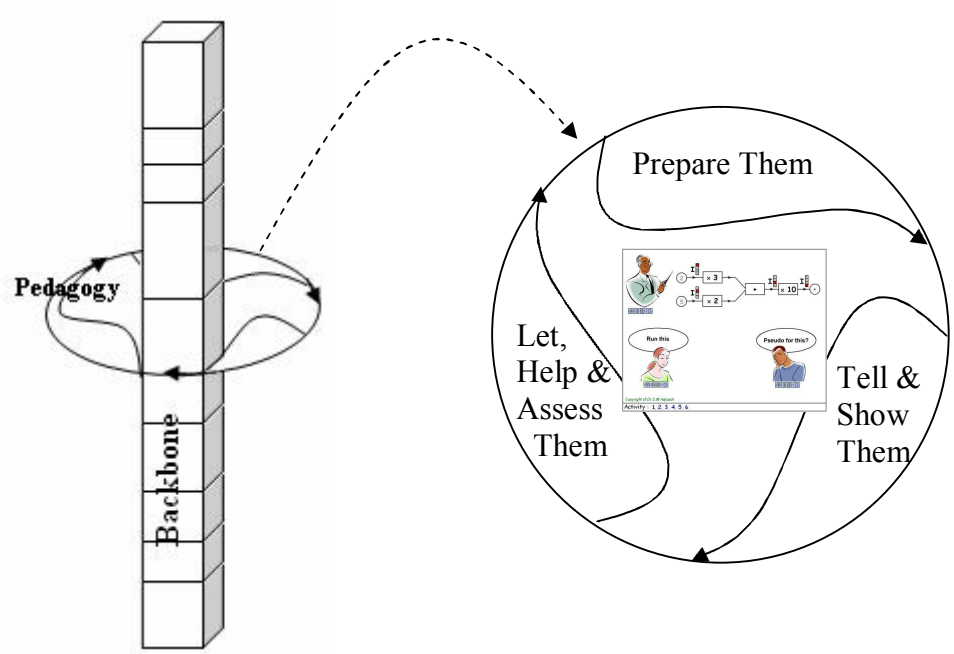


Figure 1: Blended Animated Teaching Backbone and Cyclic Pedagogy

The teaching objects of BAT contain a number of animations combining speech and moving images. This has been recognized as the most effective way of providing information for learners (Lee and Bowers, 1997, Ratner, 2002, Metcalf and Bielawski, 2003). Faraday and Sutcliffe (1997) found better recall of propositions when they had been expressed by a combination of speech and imagery. Sutcliffe and Dimitrova (1999) suggest that best learning and recall specifically in explaining procedural concepts can be achieved when spoken text synchronized with step-by-step still or moving images are used to reinforce the message.

Figure 1 shows BAT's teaching pedagogy as a rotating and rising ring round the backbone which is aimed at supporting learners through their first three cognitive objectives of 'Knowledge', 'Comprehension' and 'Application' as described by Bloom (1956). This is done by preparing them to take on a new concept, telling and showing them what it is and then letting them practise it while the educator is helping and

assessing their understanding. This way we aim to help transform them from being able to recall taught material (Knowledge) to being able to demonstrate the meaning of taught material (Comprehension) and finally to being able to use taught material in new situations (Application).

To develop BAT resources for Programming Concepts, the course content had to be completely redesigned as a number of teaching objects, which in itself was a positive move (Sharpe et al, 2006). Then, for each object, written scripts were prepared and once carefully and expertly optimized, they were recorded as mp3 files. Finally visual effects for delivery of intended learning by the spoken message were created as FLASH animations and included on the appropriate web pages.

Why Blended Animated Teaching?

Learner diversity is the biggest challenge that educators have to deal with in today's classrooms. Figure 2 depicts teaching as transmission of knowledge from an educator to learners. This teaching approach, among practitioners, is often referred to as chalk and talk. In reality this transmission is only part of teaching and learning. The largest part of teaching and learning is achieved by an interactive two-way transmission between educators and learners.

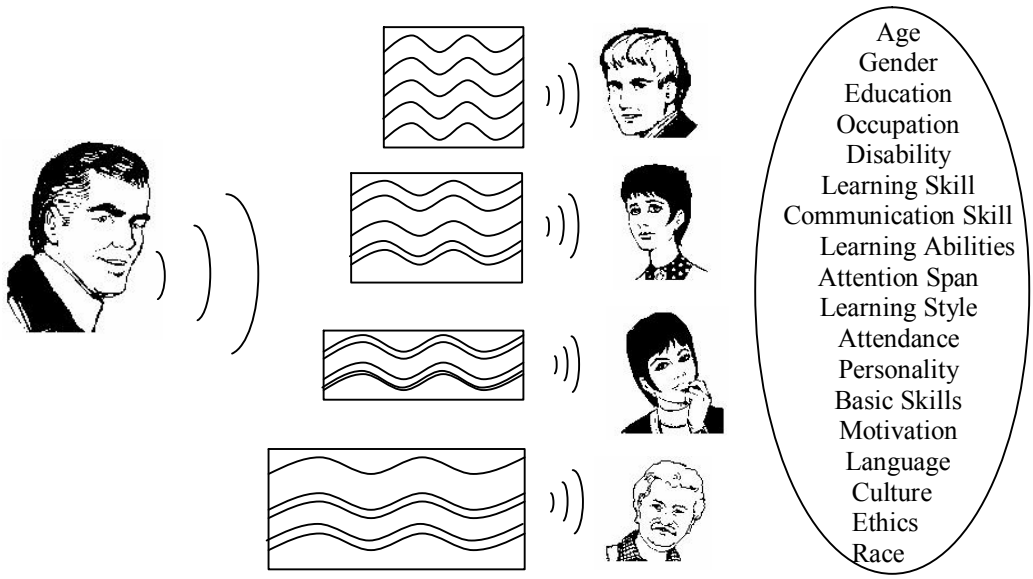


Figure 2: Learner diversity and receptiveness to teaching

However, the one-way transmission of knowledge often is the starting point for teaching a new concept. BAT's e-learning provisions assist educators only in this one-way transmission, which is demonstrated by Figure 2. Here, the different transmission media between educator and different learners are used to graphically depict learners' diversity in their learning abilities, learning style preferences and generally receptiveness to classroom teaching. Also some of the factors contributing to diversity have been identified and listed (Powell and Caseau, 2004).

Contributing factors of diversity stemming from gender, demographic, economic, social, cultural, racial and ethical differences (Lorenman et al, 2005, Davis, 1999, Gregory and Kuzmich, 2005, Harvey and Drew, 2006, Arshad, 2006, Fisher College of

Business, 2006) and disabilities (Chapman et al, 2006) are the ones most regularly considered in the literature. However, in the development of BAT e-learning provisions and pedagogy we consider diversity at curriculum level in relation to learners' different degree of receptiveness to classroom teaching.

This is demonstrated in Figure 3 as ten containers of knowledge, some fuller than others. This diagram specifically represents our HND/C students learning Programming Concepts. Normally about 10% of them nearly meet the minimum required level of curriculum knowledge. Therefore, in order to engage the other 90% of students, the educator will have to cover some of the pre-requisites of Programming Concepts. For example, some students do not understand the concept of variables, a process and even some very basic mathematical and logical issues such as inequality, value assignment, logic AND, logic OR, etc.

This means that for greater learner engagement, teaching has to begin from a much lower curriculum level. This often is not possible due to time limitations, so normally a compromise happens and teaching begins from a level that holds back and bores the most receptive students and over stretches and loses the least receptive students.

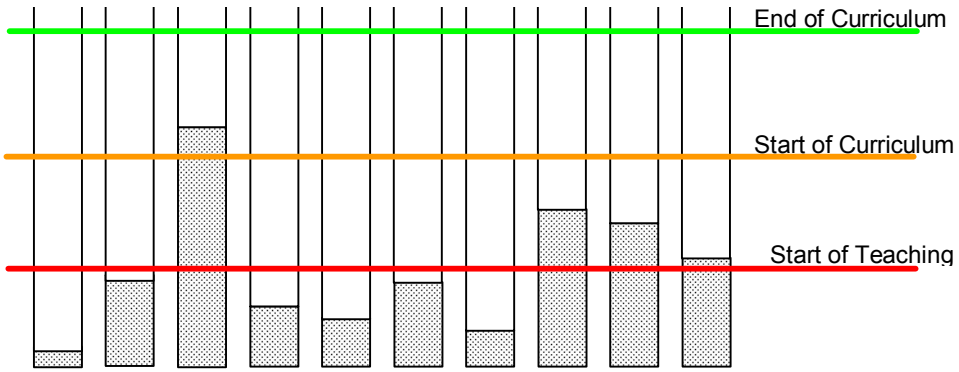


Figure 3: Spectrum of learners' receptiveness to classroom teaching

Though it is reasonable to expect that higher education students should take personal responsibility for their own learning, the reality is that they often need guidance otherwise they will not become engaged with the course. BAT's pre-rehearsed and expertly presented and organized animated teaching objects increase the efficiency of classroom teaching so much so that even some very basic pre-requisites could be included and quickly revisited within the same time limits.

The efficiency of classroom teaching is further improved by making the same teaching objects available after class via the Internet. Our experience shows that when directed by their lecturer, students do use BAT's e-learning material to revise for an exam or to complete exercises as homework. Students who need more time to practise and take longer to comprehend can use BAT in their own time and at their own pace, knowing that their efforts will improve their classroom performance. This, if used tactfully, can motivate and drive students towards fulfilling their potential.

As explained before, BAT relieves the educator from the task of one-way transmission of chalk and talk teaching, enabling him/her to focus completely on the two-way interaction with learners. This will further improve the efficiency of classroom teaching.

While BAT is delivering the teaching messages, the educator can concentrate on identifying signs of learning difficulties by observing the learners. This is virtually impossible in traditional classroom teaching since transmission of knowledge absorbs most of the educator's energy.

Using BAT, weaker students can be encouraged to do a bit more in their own time to catch up or keep up. Students can be allowed to study off campus if that suits their personality, occupation and life style. Students with irregular attendance can be given the chance to keep abreast of class progress. Students with language difficulty and deficiency in basic skills can reflect back on the lessons afterwards without the need for recording them. Also students with increasingly shorter attention span can benefit from the concise teaching messages of the teaching objects.

Using BAT, teaching of Programming Concepts was standardised, which meant that this unit could be taught in exactly the same way regardless of the lecturer in charge. Students would always benefit from the same concise, pre-rehearsed and animated teaching objects no matter who provides the extra classroom interaction. In the event of a lecturer being absent, the show could literary go on without much interruption. This also improved utilisation of classroom teaching time.

Blended learning has generally been proven to work (Gulc, 2006). BAT's web-based teaching objects cumulated around an expertly designed backbone or scheme of work and integrated into every moment of classroom teaching via a specific pedagogy provides the most concise, consistent, continuous and accurate online record of what goes on in the classroom and hence provides the best support for learners. This blend, which was created after redesigning the course contents with the intention to extend students' engagement and standardise on-campus and off-campus learning, displays all attributes of an effective and workable blended learning solution to address diversity at curriculum level.

Deployment of Blended Animated Teaching Pedagogy

In BAT's pedagogy, teaching objects and lecturer's classroom interaction with learners are primarily aimed at achieving Bloom's first three cognitive objectives in a manner similar to RWD Technologies training model (Metcalf and Bielawski, 2003) in three stages of:

Prepare Them: concerned with learner awareness
Tell & Show Them: concerned with learner recall and comprehension
Let, Help & Assess Them: concerned with learner recall, comprehension and application of knowledge

Figure 4, which is demonstrating a cross sectional view into the backbone for Programming Concepts (Figure 1), shows the time when we have reached the object for teaching arrays in a data process. Here, the revolving segments are displaying the way that BAT's provisions should be deployed in a classroom.

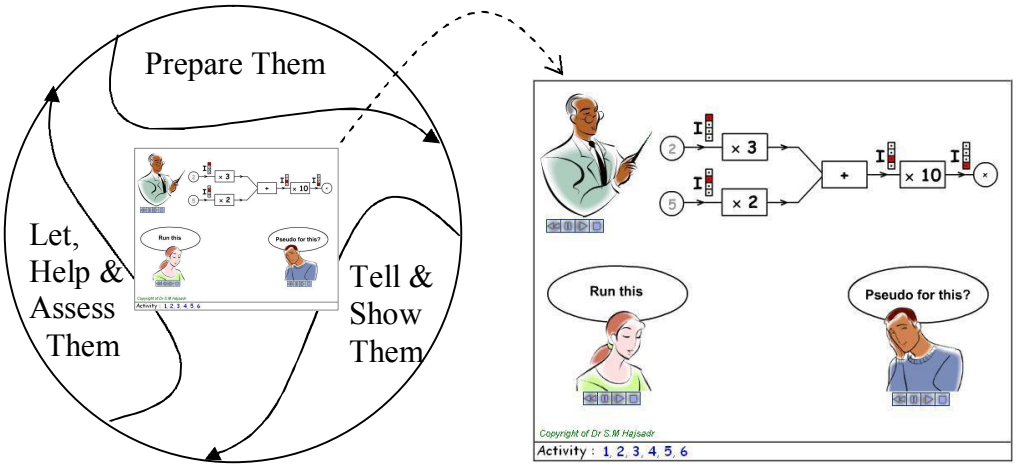


Figure 4: BAT's Cyclic Classroom Teaching Pedagogy

First, students are prepared for taking up a new concept. Here the educator's interaction with students is aimed at gathering everyone's attention and, if appropriate, quickly recalling previously taught relevant objects.

Once the educator is convinced that students are ready, then using online BAT material, an overhead projector and a simple sound system, the animated teaching messages are played, which tells and shows students what the concept is. In the meantime the educator observes learners for signs of struggling and replays and/or explains parts if required.

Finally, learners are encouraged to do a number of online activities at a pace that they are comfortable with, allowing everyone to become fully engaged. These activities have an incremental design, from simple to complex, and relate directly to the topic at hand and may involve previously learnt concepts. In the meantime, the educator observes, helps and assesses learners' understanding while moving around in the class.

Since classroom-teaching activities are aimed at helping learners reach Bloom's cognitive objective of 'Application' as explained before, the design of BAT's activities is important. Should the educator not be convinced that this cognitive objective has been reached during class time, students may be encouraged to complete more exercises as homework, revise the concept(s) for a test and/or various other directed, challenging and enticing home activities that will result in students revisiting the concepts prior to the following teaching session.

What are the results?

The radical change from a traditional teaching approach to BAT aroused curiosity and excitement among students. Imaginative animations and accompanying audio not only added the extra stimulating flavour to our class, but also ensured accurate and complete delivery of the important messages every time, all the time. Students remained completely focused and attentive throughout the time when the animations were being played. They felt confident because the material used during the lesson was also available via the Internet afterwards.

Logged hits on BAT pages shows that on average every student had visited the pages 2.3 times a week. 83% of logged visits were made less than 3 days after a lecture. 12.5% of visits were registered at very late times at night or very early times in the morning. Increase in regularity of visits were often noticed when students were asked to do an activity and submit it for marking or revise for a test.

Table 1 shows the collective views of students regarding BAT. On this table you see the questions that students were asked. You also see the average of the marks given by the students to each question. For the purpose of this questionnaire, zero (0) indicated the least or weakest level of persuasion and ten (10) the best and strongest level of persuasion.

Questions	Mean Mark
How effective is animated teaching in class when used as a resource?	8.93
How effective is animated teaching for revision?	9.00
How effective is your learning using an animated teaching material?	8.72
How effective is animated teaching as extra home support?	8.90
How often do you use such a tool to support your studies?	7.59
How confident are you of your understanding?	7.79
How memorable do you find the animated teachings?	8.17
How easy is the animated teaching compared with conventional teaching?	8.59
How helpful is the consistency of teaching using such a tool?	8.76
How much has animated teaching contributed towards your learning?	8.31

Table 1: Results from a Questionnaire

As it is shown in Table 1, the first set of five questions aimed to seek out the students' calculated responses, whereas the second set aimed to capture their feeling and their experience of using BAT. On the whole, the result of this questionnaire shows that students were inspired by this blended teaching method and had gained an improvement in their learning experience.

Some written comments from students;

"It has helped me a great deal, especially good to use when I haven't fully understood everything in class"

"You can go over something as many times as required until it sinks in. I have found animated-teaching very straight to the point. It looks like blackboard, chalk and someone talking at you."

"...especially useful for me as a night-school student when outside pressure has stopped me from attending."

"It is a permanent source of research material, one which I could safely say I would have struggled to understand some aspects of the course without it."

"You can see how certain things are done and how they work, which is easier to grasp than paper with lots text which does not always get read."

"It is a useful tool for doing homework at home. ..."

"I didn't have to wait for others to catch up."

Table 2 shows a clear improvement in students' achieved grades for the unit Programming Concepts. 12% of the students, whom without using BAT may have been held back from fulfilling their potential, achieved the highest grade of Distinction.

	Academic Year 2004-2005 Not Using BAT	Relative Frequency	Academic Year 2005-2006 Using BAT	Relative Frequency
Number of Pass Grades	11	55%	10	40.00%
Number of Merit Grades	9	45%	12	48.00%
Number Distinction Grades	0	0%	3	12%

Table 2: Comparing Student's Grades for Users and not Users of BAT.

A testimony from a lecturer teaching Visual Programming on the second year of HND/C has indicated that 2005-2006 students are interestingly more confident and are progressing much faster than previous years, so much so that she has had to generate fresh sets of activities and include topics she has normally left out from her teaching. The following comment is from this lecturer:

"...The biggest difference in our students this year is their attitude to programming. They seemed to have overcome their fear of programming and they are more open to accept new challenges and exercises given. I attribute this to your work with them. ..."

Conclusions

Blended Animated Teaching has shown to have improved the learning experience and achievement of our HND/C students in Programming Concepts. Though it requires expert educators to redesign course contents, a multidiscipline of skills and expertise to develop animated teaching objects and a different classroom teaching approach, by improving efficiency of classroom teaching it reduces the effects of diversity at curriculum level.

Preparation of BAT backbone schemes of work and animated teaching objects are very time consuming and require a multidiscipline of knowledge, skills and expertise. This often means development of BAT is slow and expensive.

Tutor-like delivery of BAT sometimes worries educators that they may find themselves out of a job, but human interaction plays a central role in BAT's classroom teaching pedagogy. Besides, development of BAT material creates new job opportunity for expert educators.

References

Arshad, R. (2006) Race equality toolkit, *Presentation by director of centre for education for racial equality in Scotland, University of Edinburgh*, (online) http://www.heacademy.ac.uk/events/media/R_Arshad_Presentation.ppt.

Bloom, B. S. (1956) Taxonomy of educational objectives, the classification of educational goals – Handbook I: cognitive domain, (New York: McKay)

Bonk, C. (2006) Blended learning: situations and solutions, *Presentation to Oxford Brookes University* (online) http://www.trainingshare.com/pdfs/SFX1D28.pdf.

Boyle, T. (2005) A dynamic, systematic method for developing blended learning. *Education, Communication and Information.* 5 (3)**,** 221-232.

Boyle, T. & Jones, R. (2005) Using learning objects to enhance blended learning, *London Metropolitan University*, (online) http://www.jisc.ac.uk/uploaded_documents/Learnobjs_ed.doc.

Chapman, V. & Morton-Jones, Z. (2006) Curriculum innovation for diversity, *University of Worcester*. (online) http://www.heacademy.ac.uk/events/media/Val_Chapman_final.doc.

Davis, B. G. (1999) Diversity and complexity in the classroom: considerations of race, ethnicity and gender, *University of California, Berkeley*, (online) http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/diverse.htm.

Faraday, P., Suttcliffe, A. (1997) Designing effective multimedia presentations, in: C. Ware & D. Wixon (Eds), *Proceedings of CHI '97*, (New York NY:ACM), 272-278.

Fisher College of Business of the Ohio State University, (2006) Diversity in the classroom, (online) http://fisher.osu.edu/offices/Diversity/Diversity-Resources/Diversity-in-Classroom.

Gregory, G. H. & Kuzmich, L. (2005) Differentiated literacy strategies for students' growth and achievement, (Corwin Press), 19.

Gulc, E. (2006) Using blended learning to accommodate different learning styles, *Higher Education Academy*, (online) http://escalate.ac.uk/downloads/2917.pdf.

Harvey, L. & Drew, S. (2006) The first-year experience: a review of literature for the Higher Education Academy, *Sheffield Halman University*, (online) http://www.heacademy.ac.uk/research/Harvey_Drew_Smith.pdf.

Higgins, S. (2003) Does ICT improve learning and teaching in schools? British Educational Research Association.

Knowles, M. S., Holton III, E. F. & Swanson, R. A. (1998) The adult learner – The definitive classic in adult education and human resource development, (Butterworth-Heinemann), 74.

Koper, R., Pannakeet, K., Hendriks, M. & Hummel, H. (2004) Building communities for the exchange of learning objects: Theoretical foundations and requirements. *ALT-J, Research in Learning Technology.* 12 (1)**,** 21 - 35.

Lee, A.Y. & Bowers A. N. (1997) The effect of multimedia components on learning, in: *Proceedings of the Human Factors and Ergonomics Society 41st Annual Meeting* (1), (Santa Monica, CA: Human Factors and Ergonomics Society), 340-344.

Lorenman, T., Deppeler, J. & Harvey, D. (2005) Inclusive education, a practical guide to supporting diversity in the classroom (Routledge, UK).

Metcalf, D. S. & Bielawski, L. (2003) Blended elearning: Integrating knowledge performance support and online learning, (HRD Products (Press)) 224, 99-100.

Oliver, M. & Trigwell, K. (2005) Can 'blended learning' be redeemed? *E-Learning.* 2 (1)**,** 17-26.
Powell, R. G. & Caseau, D. (2004) Classroom communication and diversity, enhancing instructional practice, (Lawrence Erlbaum Associates), 21-28.
Ratner J. (2002) Human factors and web development (Lawrence Erlbaum Associates), 80.
Rothery, A. (2004) VLEs and blended learning, *UCISA-TLIG Universities and Colleges Information Systems Association-Teaching Learning and Information Group*, (online) http://www.ucisa.ac.uk/groups/tlig/docs/BlendedLearningDiscussion.pdf.
Sayers, H. M., Nicell, M. A & Hagan, S. J. (2004) Supporting and assessing first year programming: The use of WebCT, *Italics e-journal.* 1 (3), (online) http://www.ics.heacademy.ac.uk/italics/Vol3-1/sayers/WebCT.pdf.
Scott, T. (2004) Addressing problems of student retention and achievement with the help of a virtual learning environment, (online) http://www.ics.heacademy.ac.uk/student_retention/research/Tony_Scott.doc.
Sharpe, R., Benfield, G., Roberts, G. & Francis, R. (2006) The undergraduate experience of blended e-learning: a review of UK literature and practice, *Higher Education Academy*, (online) 24-25. http://www.heacademy.ac.uk/research/Sharpe_Benfield_Roberts_Francis.pdf.
Sutcliffe, A. & Dimitrova, M. (1999) Patterns, Claims and Multimedia, in: J. Johnson & M. A. Sasse (Eds) *Human-Computer Interaction INTERACT '99 :: IFIP TC.13, International Federation for Information Processing*, (IOS Press).
Valiathan, P. (2002) Blended Learning Models, *Learning Circuits*, (online) http://www.learningcircuits.org/2002/aug2002/valiathan.html

Enriching learning experience through interactivity – a practitioner's view based on eMathematics

Chandra Holm
University of Applied Science, Switzerland
chandra.holm@fhnw.ch

Abstract

With the advent of the integration of digital technology in learning/teaching those teachers who continuously strive to improve the learning outcome of their students believed at first to have discovered new paths in reaching their goal. But these new technologies brought along new challenges too, and most of the promises that were ushered in by the new technologies remained for long just promises. Added to that, the characteristics of a typical learner have also undergone important changes over the past decade. Many teachers who have been integrating new technology in their teaching have started to notice that they are increasingly dealing with 'digital-natives' instead of learners who are novices or are even ignorant of the digital world. Thus any digital learning environment created today has to satisfy many requirements: it should (a) have a sound pedagogical basis, (b) implement new technology in an optimal manner, and (c) be appealing to the new generation of learners. Only such a digital learning environment really would help the teachers to improve the learning – and their teaching – outcomes. This paper discusses the pedagogical concept and the digital learning environment of eMathematics developed with the above questions and parameters in mind.

Introduction

The basic questions that continuously confront those in the teaching profession are (a) how to improve the quality of their teaching, (b) how to enrich and enhance the learning experience of their learners, and (c) how to improve the efficiency of both teaching and learning outcomes. The advent of the integration of digital technology in learning/teaching seemed at first to pave new paths in answering these questions. But these new technologies brought along new challenges too, and most of the promises that were ushered in by the new technologies remained for long just promises. Added to that, the characteristics of a typical learner have also undergone important changes over the last decade. Many teachers who have been integrating new technology in their teaching have started to notice that they are increasingly dealing with 'digital-natives' instead of learners who are novices or are even ignorant of the digital world. Thus any digital learning environment created today has to satisfy many requirements: it should (a) have a sound pedagogical basis, (b) implement new technology in an optimal manner, and (c) be appealing to the new generation of learners. Only such digital learning environments lead to answers to the questions posed above. This paper discusses the pedagogical concept and the digital learning environment of the course, eMathematics, developed with the above questions and parameters in mind.

Background Information on eMathematics

The goal of eMathematics has been to design a digital learning environment based on choice use of new technology using sound pedagogical concepts so that the learning

process will be experienced by the current generation of 'digital-natives' as enriching, efficient, and inspiring. Technology is used here as a means of realizing the pedagogical concept. eMathematics (http://www.emathematics.ch) is being developed within an on-going inter-university project funded by the Swiss Virtual Campus. Modules created for eMathematics are integrated as part of a one-semester long introductory course in applied mathematics in the first year of studies of the bachelor degree in the International Management program.

The key features desirable in a learning environment

What are the key features that are desirable in a learning environment that enhances learning and teaching? What kind of (new) pedagogy underpins learning and teaching with new technologies?

Based on the lessons learnt in the past decade, a digital learning environment that attempts to enhance learning must necessarily fulfil the following requirements:

- It must have a clear pedagogical concept as its backbone
- It must clearly illustrate the path to be taken during the learning process
- It must provide a variety of learning objects so that the learner can choose that which suits his/her learning style
- It must provide ample opportunities to the learners to learn, to explore, to practise, to reflect, and to self-check
- It must provide a rich palette of interactive features - as responses to learner actions (McCormick, 2003) so that the learners actively participate in the learning process both within individual learning scenarios and within collaborative learning scenarios
- It must NOT be just an eBook

Is there a need for a new pedagogy to create such learning and teaching environments with new technologies? Whether or not there is a need for the development of a new pedagogy to create these learning environments is left here to the educational theorists to debate. Instead couple of hints will be given in the following sections as to how a practitioner can simply adapt/modify the existing and proven pedagogical ideas and create an effective learning environment.

A learning environment suitable for the 'digital-natives'

Who are these 'digital-natives'? What are their typical characteristics?

Prensky (2007) writes in his book 'The Digital Game-Based Learning Revolution' that "*the learners have changed in some fundamentally important ways*… and that these individuals are of a generation that when growing up *deeply experienced, for the first time in history, a radically new form of play – computer and video games* - …" Prensky examines in detail about the differences between the 'traditional' learners with whom we normally dealt with for the major part of our teaching life and the 'digital-natives' (also referred to as the net generation kids) who recently have started to come to our classes. In 'Educating the Net Generation', an eBook by Educause, Oblinger and Oblinger (2005) ask: 'If the Net Generation values experiential learning, working in teams, and social networking, what are the implications for classrooms and the overall learning environment?" Brown (2005) who discusses about the learning spaces that suit

the needs of the current generation of learners states the following: "Net Gen students, using a variety of digital devices, can turn almost any space outside the classroom into an informal learning space," and says that "learning is best served when it is **contextual, active, and social**."

These three features, which in fact are derived from the constructivist theory of learning, provide the key to designing today's digital learning environment that is suitable for the 'digital-natives'.

The digital environment of eMathematics: Fulfilling promises? Meeting goals?

eMathematics is a digital learning environment, a learning space of the kind which Brown (2005) discusses in his article referred to above. Which pedagogical concept is the foundation of eMathematics? In what way are the requirements listed earlier in the section, ' The key features desirable in a learning environment' realized? What are the kinds of learning items/objects that are implemented to meet these requirements? Furthermore, eMathematics was started as a project that aimed at creating modules in applied business mathematics that would meet the following pedagogical goals:

- To involve students actively in the learning process
- To encourage students to take self-responsibility for their learning
- To show ways and methods of learning on how to apply mathematics in real life situations
- To increase the efficiency of learning of mathematics by making available to the students interactive learning environments, which they can use to deepen their knowledge
- To create a virtual environment suitable for collaborative and cooperative work amongst peers
- To help students find out the extent to which they master the topics.

How far are these initial goals met? How far is the promise of creating a digital learning environment that is enriching, efficient, and inspiring for the learners belonging to the generation of 'digital-natives' fulfilled? These are some of the questions that are discussed in the following sections.

Interactivity, the key design feature of eMathematics

The key word that describes eMathematics is interactivity. Interactivity is an essential feature of any learning environment that aims to promote active involvement of the learners. Interactivity is provided in the learning environment of eMathematics with two types of scenarios: (a) individual based scenarios in which interaction occurs as a response of the computer that is triggered by a learner action; (b) collaborative learning scenarios that foster interactivity amongst peers.

Whereas learning objects such as enhanced podcasts, instant guides, puzzles, games, breeze presentations, dedicated eTools, etc, support scenario type (a), Mathquests (to be explained later) ensure that collaborative learning scenarios are implemented. The levels of interactivity provided by the learning objects of type (a) are illustrated in figure 1 based on the classification of Schulmeister (2001). Accordingly interactivity at level 1 is limited to *viewing objects and receiving* (responses) whereas that at level 4 allows for

the *manipulation of content*. In eMathematics, learning objects at levels of interactivity 1 to 4 are already implemented.

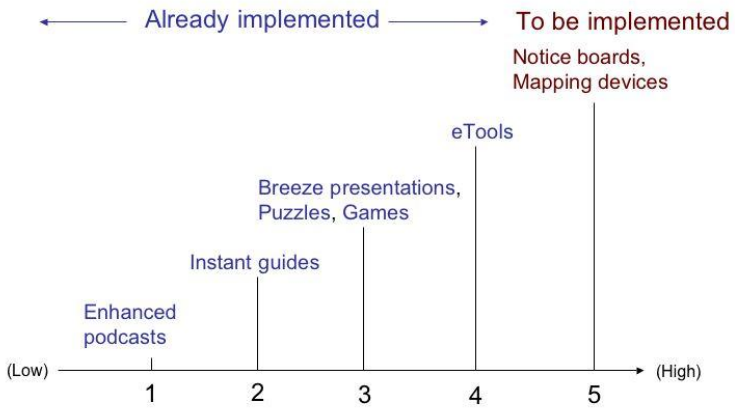


Figure 1: Classification of the level of interactivity according to Schulmeister (2001)

The pedagogical basis

The pedagogical basis of eMathematics is an adapted version of the 9-step instructional design model proposed by Gagné (1992). Though this model has been the subject of much discussion, it does propose certain key ideas that are important for the designing and structuring of learning environments (Euler and Seufert, 2005). Accordingly for implementation in eMathematics, the model of instructional design was adapted to create the six-phase learning environment as shown in figure 2 below.

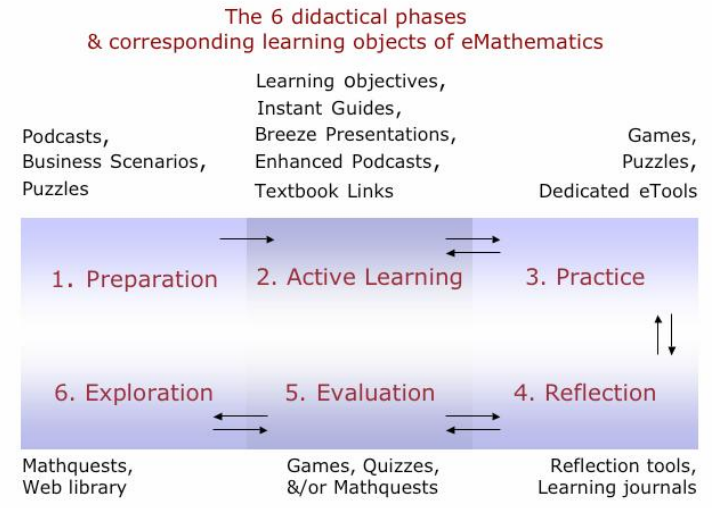


Figure 2: The pedagogical model, its six phases, and their learning objects

Each module of eMathematics consists of the above six phases. Each phase is made up of a variety of learning objects from which the learners can choose that which best suits their individual learning style. Though divided into six phases, these phases are interconnected and provide the learners the freedom to explore the learning environment at their will. By including a variety of learning objects in the second phase, emphasis is placed in eMathematics on active participation in the learning process. At the beginning of the active learning phase, a list of learning objectives is defined to show the learners

what goals they must reach by the time they complete the given module. The learning objects mentioned in the illustration above are considered in detail later in the paper.

The learning path

Another desirable feature of a digital learning environment of today is the clear illustration of the path to be taken during the learning process. Such a path lists not only the various learning stages and the items that make up these learning stages but also provides information on the interconnectivity amongst the various learning stages and items. (See figure 3 for an example of the learning path.) Additionally, information is given at the start of each phase about the minimum time that should be invested for working efficiently with a given learning object. At the same time it is made clear to the learners that such learning paths and times given are to be understood purely as recommendations only.

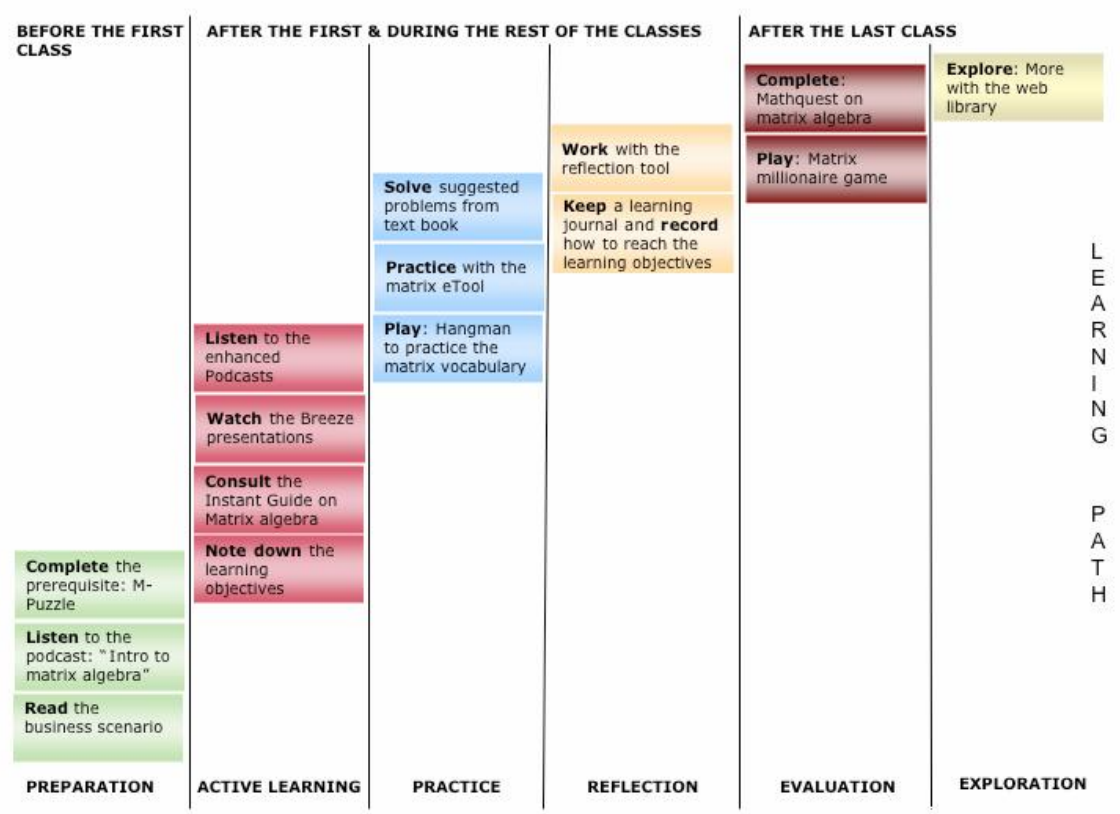


Figure 3: The suggested learning path of the module, matrix algebra

Diversity in learning objects

To provide a rich diversity of learning objects is the next desirable key feature of a digital learning environment. Puzzles (M-Puzzle and Euler portrait puzzle), and games (Maths-Millionaire and Hangman) that create trusted environments in which the 'digital-natives' usually move about, and – more importantly - make learning mathematics a 'fun' - albeit serious - experience; enhanced podcasts which make learning truly independent of time and space attracting immediately the iPod-Generation of learners; Instant guides that present the important concepts in a condensed manner for quick reference; (Macromedia) Breeze presentations that illustrate the steps of

solving a problem in detail and help learners revise a step they might be unsure of; reflection tools that propose real-life questions that emphasize thinking about the ways of arriving at answers rather than about figuring out the answers, are just some of the diverse kinds of learning objects provided by eMathematics.

The thoughts behind using a digital game-based environment to enable interactivity in eMathematics will be explained here by considering in detail one of the puzzles included in eMathematics, the Euler portrait puzzle. These will be looked at from the point of view of both the learners and the teachers.

Euler portrait puzzle - and the other puzzles and the games used in eMathematics – are created using a template. The goal of this puzzle is to complete the portrait of the great Swiss mathematician, Leonhard Euler (1707-1783), by means of completing given mathematical statements/phrases listed as 1 to 12 with the help of the matching tiles A to L (see figure 4.)

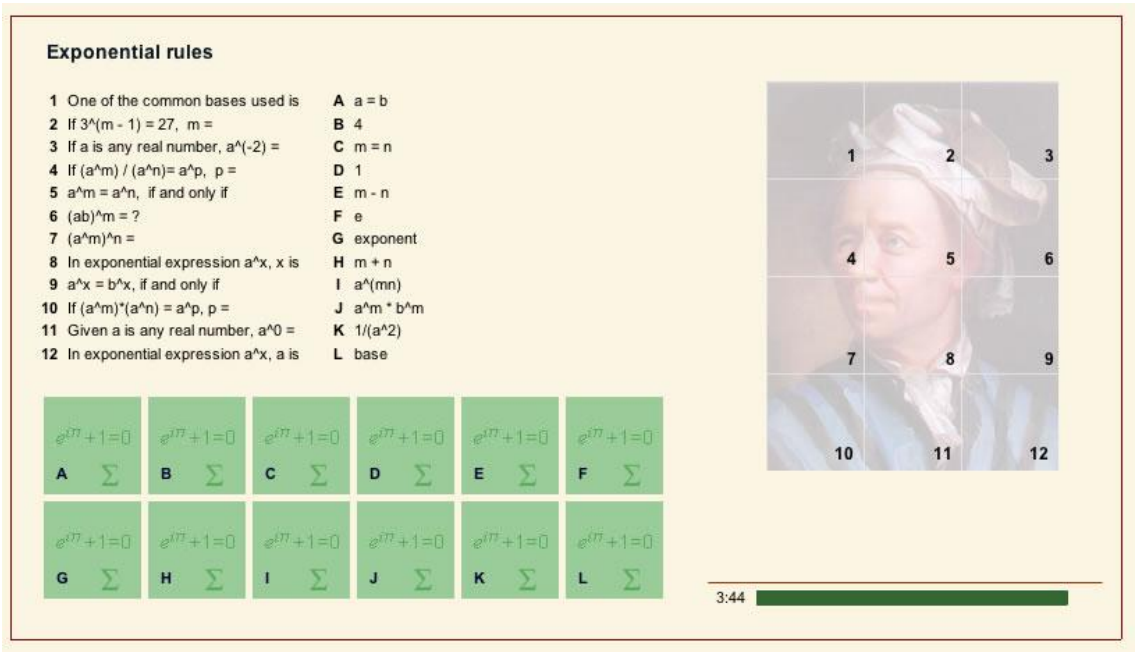


Figure 4: Illustrating the interface of the Euler portrait puzzle

The procedure of solving the puzzle consists of selecting, dragging one of the green tiles - A to L - and dropping it onto a chosen tile numbered 1 – 12 shown on the masked portrait of Euler in the puzzle. When all the tiles 1 to 12 are matched with their corresponding parts A to L, the learner can check if his/her selections are correct. If the tiles are indeed correctly matched, the portrait of Euler will be unmasked and bordered with a frame, and a short biography of Euler appears below the portrait. If any of the tiles do not match (given mathematical statements/phrases are not properly completed), then that part(s) of the portrait remain unmasked. The learner is given an opportunity to try again at matching the incorrect parts. If the learner is unsuccessful in solving the puzzle in the given time, a curtain descends and covers the portrait of Leonhard Euler!

From the learner's point of view, such puzzles as the Euler portrait puzzle (and games like Maths-Millionaire), provide a learning environment with which they are familiar with as many of today's learners have grown up with computer and/or internet based

games. The puzzle provides instant feedback. Every learner can work in privacy, a factor which is important as the puzzle shown above is mainly used to check prerequisite knowledge before starting a new module. The fact that the puzzle is time-limited introduces an element of tension that is much appreciated by learners of the 'digital-natives' generation. Though the actual solving of the puzzle is time limited, there is no limit on the number of times a learner tries the puzzle. It is a deliberately formed decision not to maintain any record of such information, a fact that is again appreciated highly by the learners.

From the teacher point of view also, such puzzles bring added values to their teaching environments. With such scenarios, the teachers have little trouble in attracting current day learners. They also succeed in inspiring the weak and not-so-motivated learners to attempt to learn mathematics. As the puzzles – and games - are based on reusable templates, and as the data bank is created with the help of an editing tool, creating new puzzles and games needs little time, a fact that is certainly appreciated by many teachers. The mathematical statements that are used in the puzzle are randomized so that the teacher can be sure that each time the learner attempts to solve the puzzle the statements and their matching parts appear in a different order.

Ample opportunities to learn, to explore, to practice, to reflect, and to self-check

Providing ample opportunities for learning, exploring, practising, reflecting on the knowledge acquired, as well as chances for self-evaluation, are the other key features of today's digital learning environments that aim to promote active participation of the learners. The learning objects as described in earlier sections meet this requirement and do it in a manner suitable to the 'digital-natives' generation. In this section Mathquests, dedicated eTools, and reflection tools are explained in detail.

Mathquests are used in eMathematics to provide collaborative learning environments within each module. Mathquests are in their core character nothing but assignments given to groups of students. But they are assignments with a difference. The basis of each Mathquest is a topic as yet unexplored by the learners. It is made up of two parts: (a) a theoretical part, and (b) an application part. Each Mathquest is assigned to two groups of three learners each. Each group is initially responsible to either part (a) or (b). In the first phase of the Mathquest each group has to prepare a document with detailed answers to the questions raised in the part the group is responsible for, and upload it onto their personal virtual room before the specified deadline. In the following phase, the groups meet and exchange the documents, provide feedback, prepare a common document about the entire Mathquest and submit it to the teacher before the final deadline. The groups decide on the format (virtual or not) and duration of the meeting. The teacher provides the final feedback on the work submitted. The entire process is based on exploring deeper into a topic whose basics have been mastered, and in collaborating with peers in doing the same.

Dedicated eTools help in simulating calculations and appropriate mathematical scenarios. An example of the dedicated eTool on finance is shown in figure 5. With this eTool, to start with the learner selects from a drop-down list the kind of calculation that is to be done. Appropriate fields appear at this stage at top left. The learner enters the given data in these fields. Following this stage, a time line that describes the given finance scenario appears at top right, the formula to be used to complete the calculations

is shown at bottom left, and the complete calculation itself is shown at the bottom right. The data fields, the components of the timeline, the formula, as well as the calculations shown are all colour coded so as to visualize the given scenario and to establish links amongst the various stages of operation. Special attention is drawn here to the red comment bar at the very left of the interface. This comment bar, when activated with the computer mouse, gives a short explanation of the features of the topic, annuity due, treated here. Learners can carry out five different kinds of operations relating to finance mathematics with this dedicated eTool. A similar eTool is provided in eMathematics to carry out operations of matrix algebra.

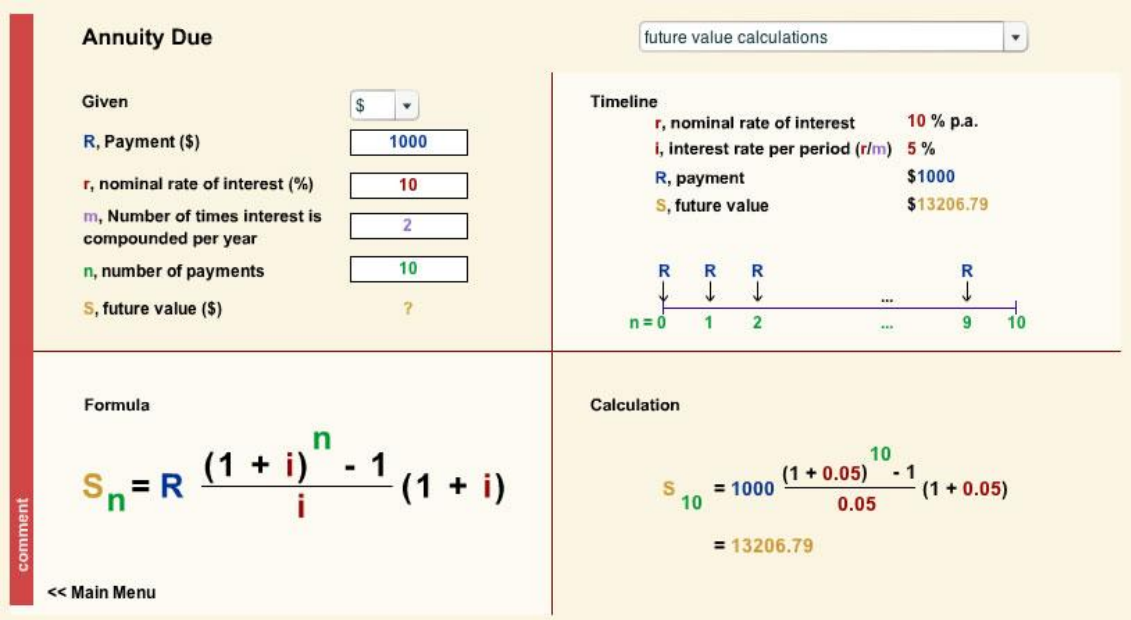


Figure 5: Illustration of the interface of the finance eTool

Based on the premise that "reflection emphasizes understanding as opposed to practical application" (Kolb, 1984), reflection tools used in eMathematics place emphasis on the means to the end and not on the end itself. Through these tools, the learners are encouraged to think about the application of the mathematical ideas and operations they have learnt in solving simple real-life situations. The learners are told that their job is NOT to provide answers but to THINK about the process they will adapt to arrive at the possible answers. These reflection tools specially address those learners who, for example, start adding, subtracting, multiplying or dividing given numbers, without making much effort to think about whether they should, in fact, be adding subtracting, multiplying, dividing, or doing something totally different!

Anything but NOT an eBook!

From the very beginning the vision in creating eMathematics was about designing a suitable digital learning environment in which all the practical experience gained in the past decade in adapting new technology for teaching is distilled and implemented. The basic belief in creating such an environment was that there was/is never a dearth of good textbooks to learn any subject, that whereas a very good student might not often need anything more than a good textbook, the manner of presentation of the learning

content is what makes a world of difference in motivating and inspiring 'ordinary' learners, and helping them to succeed. Finally, it was clear from the very beginning that such a digital learning environment has to address new kind of learners ('digital-natives') who have spent a good part of their life with computers, with the internet, with play stations, with iPods. eMathematics is a digital learning environment which is the product of all these ideas and it is anything but a simple, downloadable eBook!

References

Brown, M. (2005) Learning spaces in: D. G. Oblinger & J. L. Oblinger (Eds) *Educating the Net Generation - A New EDUCAUSE e-Boo.,* (online) Available from: http://www.educause.edu/LearningSpaces/6072 (cited 30 April 2007).

Euler, D., Seufert, S. (2005) *Learning Design: Gestaltung eLearning-gestützter Lernumgebungen in Hochschulen und Unternehmen*, *SCIL –Arbeitsbericht 5*. (online) Available from: http://scil.ch/publications/reports/index-en.html (cited 29 April 2007)

Gagné, R. M., Briggs, L. J., & Wager, W, W. (1992) Principles of Instructional Design (Belmont, Wadsworth).

Kolb, D. A. (1984) *Experimental Learning* (Eaglewood Cliffs, Prentice Hall)

McCormick, R. (2003) Keeping Pedagogy out of learning objects. (online) Available from: http://celebrate.eun.org/eun.org2/eun/en/Celebrate_Calendar/entry_page.cfm?id_area=494 (cited 30 April 2007)

Oblinger, D. G., Oblinger, J. L. (2005) Introduction in: D. G. Oblinger & J. L. Oblinger (Eds) *Educating the Net Generation - A New EDUCAUSE e-Book.* (online) Available from: http://www.educause.edu/Introduction/6059 (cited 30 April 2007).

Prensky, P. (2007) *Digital Game-Based Learning*, (St. Paul, Paragon House).

Schulmeister, R. (2001) Taxonomy of Multimedia Component Interactivity – A Contribution to the Current Metadata Debate. (online) Available from: http://www.izhd.uni-hamburg.de/pdfs/Interactivity.pdf (cited 30 April 2007).

Being and belonging: the importance of identity in online learning groups and communities

Dr Gwyneth Hughes
Institute of Education, London
Gwyneth.hughes@ioe.ac.uk

Abstract

Growth in sophisticated online tools for facilitation of co-operative and collaborative learning at a distance has brought social and pedagogic benefits, but there are problems with the level of participation in online groups and communities and many learners appear to be excluded.

Wenger (1998) in his work on communities of practice argued that members of learning communities need to identify with the community and I develop this further by introducing a concept of identity congruence or incongruence between learners and virtual groups. Some individuals will readily negotiate online identities which align with available group identities but others will not, because 'belonging' to online groups is influenced by wider discourses of identity such as profession, gender, class, age, etc. This identity incongruence explains why unproductive group dynamics, superficial interaction and non-participation persist. Negotiating congruence is the key to social learning, although congruent but exclusive groups are also not desirable.

The paper offers some suggestions for 'identity work' that could be undertaken by both online facilitators and learners to promote identity congruence and engagement in online groups, both by enabling individual identities to shift and group identities to be more inclusive of diversity. I finally propose that professional development for those designing and supporting online collaboration needs to be responsive to the importance of identity and belonging in groups.

Introduction

Over the past decade there has been a growth in sophisticated online tools for facilitation of co-operative and collaborative learning at a distance. But while there are clearly social and pedagogic benefits for a new collaborative model for distance learning (Thorpe, 2002), there are concerns about the level of participation in online groups and communities. There is a sense of acceptance by teachers that some learners will engage in online group work, others will be passive observers, while a significant proportion will not participate. This is tantamount to admitting that some persons will inevitably be excluded from online learning communities.

The paper begins by highlighting the importance of identity for e-learning. Wenger (1998) in his work on communities of practice proposed that members of learning communities need to identify with the community and I develop this further by introducing a concept of identity congruence between learners and virtual groups. Some individuals will readily negotiate online identities which align with available group identities but others will not (Merchant, 2006) and there is a need to understand

how 'belonging' to online groups is negotiated in accordance with wider social identities such as profession, gender, class, age, etc. (Hughes & Scott, 2005). I argue that negotiating this identity congruence is the key to social learning and incongruence explains unproductive group dynamics, superficial interaction and non-participation.

Negotiation of identity congruence can be facilitated and encouraged. In the following section, I offer some suggestions for 'identity work' that could be undertaken by both online facilitators and learners to promote identity congruence and engagement in online groups, both by enabling individual incongruent identities to shift and reconfiguring group identities to be more inclusive of diversity. I conclude that there is important professional development needed for e-learning facilitators.

Identity and collaborative learning

Anyone who has joined in a virtual communication as part of e-learning, whether as a facilitator/tutor or student, will know that not everyone takes part and that the level of enthusiasm shown by potential e-learning community members is very variable. There is clearly an issue of inclusion/exclusion in social e-learning. Access to technology at home or in the workplace has been an issue for some in the past and will no doubt continue (Kirkup, 2001; Selwyn, 1998), however, my focus is ongoing inclusion/exclusion and diversity rather than initial access to learning. Diversity does not disappear when a learner enrols on a programme, and studies of retention show that exclusion can occur from within (Yorke, 2004).

Supporters of collaborative e-learning have been interested in how communities are formed and maintained. Wenger's (1998) work on communities of practice and situated learning has been influential on studies of online community building. He describes how communities of practice form when people mutually take part in a common enterprise such as wine tasting or teaching physics, and how they develop shared resources and negotiated meanings around this practice. Wenger emphasises that community members need to move on identity trajectories which align with the goals negotiated by the community to become a situated learner in that community.

> Because learning transforms who we are and what we can do, it is an experience of identity (Wenger, 1998: 215).

This identity must be reconciled with other community memberships and identities to form a complex and personal sense of self.

Identification with an institution, programme or discipline has been acknowledged by others as important for retention (Read *et al*., 2003), and this sense of belonging might also explain why not everyone takes a full part in e-learning and why some, and not others, are willing to persist with new and unfamiliar technologies and challenging ways of working collaboratively (Hughes & Lewis, 2003). There is some evidence that the disembodiment of e-learning makes the formation of cohesive groups online more difficult than in the classroom. Not all learners find the textual communication with unseen persons useful and fulfilling (Bayne, 2004) and many do not feel they have a social presence online (Gunawardena & Zittle, 1997).

However, the importance of identity in forming effective groups for online courses is not well explored in e-learning literature. Perhaps diversity of identity, which is so important for understanding inclusion in the physical world, is neglected online because the relative anonymity is assumed to overcome exclusion based on colour of skin, gender, accent, etc. which might occur if community members were physically present (Rogers & Lea, 2005). But online groups, where the diversity of the community may be more 'hidden', can still be exclusive. This is because textual communications provides plenty of clues about gender, professional identity or ethnicity for those who 'listen' online (Hughes & Scott, 2005). For example, communication processes are gendered; women post more frequently while men send longer messages (McSporren & Young, 2000; Herring, 1994). To understand further how online identity is expressed, we need to appreciate how identity is discursively constructed.

Identity theorists have long argued that identity is not fixed but is performed according to the context (Goffman, 1978; Bulter, 1990). Identity is thus contingent, fluid and under continual construction and reconstruction. Turkle (1995) has shown that it is relatively easy for people to construct fluid and multiple identities for themselves online in chat rooms and games and 'play' with new identities and avatars.

But identity is not an improvisation on an open stage without a script: there are constraints. Giddens (1991) views identity as a reflexive project to develop a coherent narrative of self. Even from post-structuralist perspectives, identity is a position available in discourse which can be taken up or rejected (Davies, 1989). People align themselves with the prevailing meanings or discourses of some identities, but must reject others to produce a coherent narrative. For example, within a dominant discourse of science and technology as abstract, rational and detached, an identity position of scientist is not available to women with a gender identity constructed through discourses of femininity which reject such 'masculine' ways of knowing and doing (Hughes, 2001). This usually obscure process of constructing identity within dominant discourses explains why decades of campaigning to attract more women into science and technology has had only partial success. To identify as scientists or technologists, women would have to challenge and reconfigure prevailing discourse of science and/or femininity. Dissociation from a scientist identity is a far easier option.

Identity congruence in social e-learning

The process of constructing and reconstructing identities within wider discourses and practices may appear unconstrained when the main form of communication is written text, as it is in most virtual communication. However, the problem of how to reconcile multiple identities does not disappear and community or group membership is not a given but requires constant negotiation.

To understand the process of learner identification with a particular community, I propose a new concept of identity congruence. Congruence will occur when an individual's social identities such as ethnicity, nationality, gender and occupational status are consistent with the identities negotiated by an online group or community to give a coherent self identity. The group identities will be influenced by these wider educational and social macro-level discourses as well as discourse internal to the group. A shared group identity may be explicitly acknowledged by group members: it could be agreed that they are the students on a programme or members of a subgroup X who are

supportive towards each other during an activity or task. But, less obviously, the identities of the group will be implied through the micro-level rules and behaviours that emerge as dominant in the group, which are in turn influenced by macro-level discourses of social identity.

I propose that identity congruence is the basis for social learning. Where there is identity congruence we would expect an individual to be much more likely to participate fully in a group than where there is incongruence. In the latter case, situations of disharmony may arise between identities of members or there may be conflicting available identities for an individual, perhaps leading to limited engagement with the group or unresolved challenge to its purposes.

But, although identity congruence may be necessary for engagement, it does not guarantee that learning will take place. Wenger (1998) argues that not all communities of practice are learning communities. As new members join and move from peripheral to fuller participation, they bring with them contacts with other communities and new ideas. In other words, they bring diversity to the common enterprise and this is what enables the community as a whole to learn and develop. But a community which requires new members to become replicas of existing members may become stifled and resistant to change and growth. A community that does not entertain diversity will not be a learning community. An example could be a close knit group involved in collusion over an assessment. To develop and learn, a community or group needs to find ways of viewing outsiders as potential members and establishing sufficient congruence between these individual identities and the evolving group identities.

Negotiating identity congruence in online collaboration

Having proposed the concept of identity congruence as fundamental to collaborative learning, questions arise about how congruence might be achieved. From a perspective that identity is contingent and continually under (re)construction, identity congruence is not pre-existing but requires negotiation and a position of congruence or incongruence will be inevitably subjective, partial and temporary although in longer-term groupings, such as a discipline cohort, relative stability may emerge. Identity congruence is, therefore, not measurable and can only be interpreted by close examination of group and individual interactions.

Most people are willing to introduce themselves to an online group if prompted. Following Salmon's (2000) five stage model for e-moderating, it has become standard practice for e-learning courses to start with an introductory exercise. As the community begins to coalesce around a particular enterprise and associated behaviours, identity in/congruence develops between individual participants and the group. A match between the topic of online discourse and an individual's interests and identity is the most obvious way in which identity congruence may or may not be negotiated, such as in the example of gender and science earlier. But this might not be the most significant manifestation of diversity. In online communities there may be different ways of interacting: asynchronous or synchronous, different patterns of participation in terms of frequency, regularity or time of day/night, different writing styles: formal or informal, lengthy or succinct, academic or personal, and different learning approaches: collaborative or independent, supportive or challenging. Some learners do not identify with e-learning at all and view it as a threat to human contact and thus do not engage.

All the above interactions contribute to the construction of identities in discourses of class, gender, etc. which form a complex narrative of self.

For example, in my online teaching (Hughes, 2007) I have set up co-operative activities which seem to work well in encouraging many learners to join in, but there will invariably be someone who posts a contribution at a much later time than the rest of the group, perhaps because of a personal identity dominated by work or domestic responsibilities which take priority over being a learner. As a consequence of late posting they will probably not elicit a response from anyone. Such learners often experience identity incongruence and exclusion from the group.

Identity congruence implicitly underpins much of the work on e-moderating and good practice in design for collaborative learning. In her well-established work, Salmon (2000) explains how e-facilitators and e-learners need to develop rapport. McConnell (2006) describes highly supportive behaviour of learners and tutors on his carefully designed MEd in E-Learning programme. But there is little evidence on whether or not e-facilitators and e-learners themselves succeed in ensuring inclusion online through explicitly developing identity congruence for a diversity of members. I next consider some suggestions for improving engagement for a wide range of learners.

Doing 'identity work' to increase engagement of learners

I have argued that providing space for learner interaction does not ensure that all learners engage fully because some learners may have uncomfortable experiences of identity incongruence and disengage. In addition, too much congruence can have undesired consequences such as in cases of collusion or plagiarism in outcomes orientated sub-groups who do not have identity congruence with the wider academic community in which they are situated.

Identities are reconfigured in all aspects of life and not only in formal learning settings, but those working with learners can exert some influence. The challenge for educators is to facilitate identity congruence with a learning group or community through doing 'identity work' with learners. Identity work could:

- enable learners to shift identity so that they do engage with e-learning communities and/or
- challenge the identities under negotiation by e-learning groups to welcome more diversity.

Ways of enabling learners to shift identity might include:

- Reflective writing such as blogs and journals

Critical reflection is a useful way of interrogating one's own behaviours and the identities which support these behaviours. It is difficult to challenge peer identities, so challenging oneself through internal dialogue from another perspective is useful. One example I have used was to encourage trainee lecturers to write accounts of their teaching experiences from not only from their own perspective but from the perspective of their learners (Hughes, 2006). This has encouraged a useful identity shift from

lecturer as a transmitter of content to lecturer as engaging with a community of learners with a range of needs.

- Role play and taking sides in a debate

Role play could be a useful way of enabling learners to experience new identities and encourage identity shifts. In an approach termed 'structured controversy', learners debated an issue from two perspectives and were required to engage with counter-arguments and this was more likely to produce long term change of opinion than an unstructured discussion of the issue (D'Eon *et al,* 2007).

- Interpreting communication and participation patterns and responding

Learning to 'read between the lines' (Hughes & Scott, 2005) and recognise identity incongruence in online discourse would enable a facilitator to identify contributions which are out of place in, for example, written style. A supportive intervention may be required. Monitoring the pattern of message postings and interaction can also be very useful if, at the same time, learner participation is noted. This will give information about late entrants and non-participation. If, as in the example above, late entrants to the group are not being included the facilitator could respond by setting up an additional latecomers' group and persuade others to engage with this group.

Ways in which facilitators can encourage groups to modify and extend the identities that are welcomed in that group or community include:

- Helping groups understand the benefits of diverse rather than friendship groups

A recent report on the first year experience of undergraduates identified that friendship groups were very important (Yorke & Longden, 2007). However, such groups are likely to consist of those with similar backgrounds and identities based on, for example, age or ethnicity and may need to be discouraged if they are not connecting with other communities. Groups which form around diversity will have wider perspectives.

- Explicitly rewarding engagement with diversity and change

One of the best ways to change learner behaviour is through assessment and rewards. Assessments could be designed so that working with diversity or evidence of challenging existing knowledge is required. Gibbs & Simpson (2004) have argued that formative feedback has a greater effect on learning than summative and much more use could be made of this. But learners' interpretation of feedback is influenced by their conceptions of what counts as learning and knowing and they may not understand assessment criteria. Peer and self assessment techniques are valuable in helping learners understand criteria - through interrogating, experiencing and reifying the rules and discourse of the academic community of practice in which they are situated (Wenger, 1998) and through this process foster a sense of belonging in a diverse community.

- Identity construction games

There are possibilities for examining identity more explicitly. An online 'identity swapping' game required participants to interpret the fabricated gender, nationality and

age of anonymous contributors (Hughes & Scott, 2005). Participants were very anxious about making errors of judgement when they tried to find out more about each other's identities and relied on stereotypical assumptions such as equating interest in sport with males. But the game also enabled participants to gain better awareness of how identity is constructed online. It is to be hoped that greater identity awareness might stimulate a willingness to include diversity in the group.

Conclusion: identity work as staff development

I have explored how negotiation of identity congruence is the key to success in social e-learning. An important role for teachers, facilitators and learning support staff is to ensure that learners are not excluded through identity incongruence while, at the same time, discouraging the narrow exclusivity which inhibits learning. I have outlined some ways of achieving this through identity work. But we as teachers cannot expect to take a group of learners on a journey in which they reframe their personal identities without challenging ourselves at some point. I conclude by suggesting that many more development opportunities for teachers and learner support staff are needed to help them in both developing identity awareness and constructing new identities for an increasingly digital world. Thus, my suggestions for identity work apply equally to those whose job it is to lead and facilitate e-learning as it does to e-learners.

References

Bayne, S. (2004) '*Mere Jelly': The Bodies of Networked Learners,* Networked Learning Conference, Sheffield.

Butler, J. (1990) *Gender Trouble: Feminism and the Subversion of Identity* (London, Routledge).

Davies, B. (1989) *Frogs and Snails and Feminist Tales* (London, Allen Unwin).

D'Eon, M., Proctor, P., & Reeder, B. (2007) Comparing two cooperative small group formats used with physical therapy and medical students *Innovations in Education and Teaching International* 44(1): 31-44

Gibbs, G. & Simpson, C. (2004) Conditions under Which Assessment Supports Students' Learning. *Learning and Teaching in Higher Education* 1: 3-31

Giddens, A. (1991) *Modernity and Self-Identity: Self and Society in the later Modern Age* Cambridge, Polity)

Goffman, I. (1978) *The presentation of Self in Everyday Life* (The Penguin Press, London) (first pub. UK 1969, USA by Anchor Books in 1959).

Gunawardena, C. & Zittle, F. (1997) Social Presence as a Predictor of Satisfaction within a Computer-mediated Conferencing Environment *The American Journal of Distance Education* 11, 3, pp. 8-26.

Herring, S. (1994) Gender differences in computer-mediated communications: bringing familiar baggage to the new frontier. *http://www.mith2.umd.edu/WomensStudies/Computing/Articles+ResearchPapers/gender-differences-communication [Accessed Feb. 2005]*

Hughes, G. (2001) Exploring the Availability of Student Scientist Identities within Curriculum Discourse: an anti-essentialist approach to gender inclusive science, *Gender and Education* 13, 3, pp. 275-290.

Hughes, G. and Lewis, L (2003) Who are successful online learners? Exploring the different learner identities produced in virtual learning environments, in: Cook, J. & McConnell, D. (Eds) *Communities of Practice*. Research Proceedings of the

10th Association for Learning Technology Conference (ALT-C 2003). Held 8 - 10 September 2003, The University of Sheffield and Sheffield Hallam University, UK

Hughes, G. & Scott, C. (2005) No pain no game: use of an online game to explore issues of online identity and the implications for collaborative e-learning, *E-Learning,* 2, 4, pp. 388-401.

Hughes, G. (2006) What's in your bag? How reflection on everyday practice can help us become more self-critical *Educational Developments* Issue 7.4 Nov. 2006 pp. 7-9

Hughes, G. (2007 forthcoming) Diversity, identity and belonging in e-learning communities: some theories and paradoxes *Teaching in Higher Education.*

Kirkup, G. (2001) Getting our Hands on IT. Gendered Inequality in Access to ICTs Conference paper at *Gender and Virtual learning*, Hagen, Germany.

McSporren, and Young, S. (2001) Does Gender Matter in Online leaning? *Association for Learning Technology Journal* 9,2, pp. 3-15.

McConnell, D. (2006) *E-Learning Groups and Communities* (Maidenhead, Open University Press).

Merchant, G. (2006) Identity, Social Networks and Online Communication *E-learning,* 3(2): 235-244

Read, B., Archer, L. and Leathwood, C. (2003) Challenging Cultures? Student Conceptions of 'Belonging' and 'Isolation' at a Post-1992 University, *Studies in Higher Educatio*n, 28,3, pp. 261-277.

Rogers, P. and Lea, M. (2005) Social presence in distributed group environments: the roles of social identity, *Behaviour & Information Technology,* 24,2, pp. 151-158.

Salmon, G. (2000) *E-moderating: The Key to Teaching and Learning Online* (London, Kogan Page).

Selwyn (1998) The effect of using a home computer on students' educational use of IT, *Computers and Education,* 31, pp. 211-227.

Thorpe, M. (2002) Rethinking Learner Support: the challenge of collaborative online learning *Open learning* 17(2): 105-119

Turkle, S. (1995) *Life on the Screen: Identity in the Age of the Internet* (New York, Simon & Schuster).

Wenger, E. (1998) Communities of Practice: Learning, Meaning and Identity. (New York, Cambridge University Press).

Yorke, M. (2004) Retention, persistence and success in on-campus higher education, and their enhancement in open and distance learning, *Open Learning,* 19,1, pp. 19-32.

Yorke, M. & Longden, B. (2007) The first year experience in higher education in the UK Higher Education Academy Report http://www.heacademy.ac.uk/research/FirstYearExperience.pdf [Accessed May 2007]

Regatta for life and learning? Trends and blends in distance education at the secondary level in Iceland

Sólveig Jakobsdóttir
Sigurdur Fjalar Jónsson
Thórhildur Elfarsdóttir
Sigurbjörg Jóhannesdóttir

Kennaraháskóli Íslands (Iceland University of Education)
soljak@khi.is

Abstract

In this paper we will report on the results of a study of distance and distributed education and the blend or mix of teaching methods and technical solutions that are being used in Iceland at the upper secondary school level. We attempt to map the fast changes occurring from the standpoint of administrators, teachers and students. Administrators in all 29 high schools/junior colleges in Iceland were contacted in the fall of 2005 and again in the fall of 2006 and interviewed and from eight of those schools, teachers and students are being interviewed this spring, revealing how they are experiencing the school blends and trends. In a final version of the paper, results and discussion will be more up-to-date and detailed.

A "regatta" of a sort may be starting between schools at the upper secondary school level in Iceland. Schools are increasingly competing with each other, trying to reach more students than before, and to provide access to a wider variety of courses through distance education and/or distributed education (DE). Secondary schools have been steadily increasing their offerings of DE programs and things have been moving fast in this regard. Rural schools began relatively early to offer distance education to their students, mostly due to fact that students in the countryside are more geographically dispersed. Schools in and around Reykjavík have also increasingly started to offer distance learning courses.

Unfortunately, the drop-out rate has been relatively high in the country during the first years of high school/junior college (non-mandatory schooling) for a long time. The trend towards more distance education may not help in that regard since dropout rates in distance education have been reported to be about 40% or with a range between 19 and 90% (Potashnik & Capper, 1998). The main goal of the study presented in this paper is to examine how the schools at the upper secondary level are blending onsite and online or distance learning and look at how administrators, teachers and students are experiencing and viewing those blends. The results can hopefully be utilized by schools within and beyond the country to learn from each others' experiences and to improve their blends, helping them to sail rather than sink when they move with the flow.

The concepts distance education/learning, distributed education/learning, and blended learning will be used quite often in this paper. Because definitions vary we will attempt to clarify how we use them. Simonsen, Smaldion, Albright and Zvacek (2003), like most who define the concept distance education, emphasize that in distance education teachers and student(s) are separated. They also look upon distance education as

institution-based; that there is interactivity or some form of telecommunication used; and a joint pool of materials, information, and experiences.

In Iceland the term distributed learning has become popular in the past few years. In a project plan, the Icelandic Ministry of Education, Science and Culture (2001) emphasize a hybrid nature of distributed education or learning, describing it as a blend of campus-based or on-site learning and distance learning or net-based learning, which agrees e.g. with Bates (1996) definition. Many schools use the concept to describe a program that has grown directly from a regular program but with reduced time for classroom meetings. Bates defined "a distributed learning environment" as a learner-centered approach, which integrated a number of technologies for activities and interaction in asynchronous and real-time modes; a model which was based on blending campus-based delivery with open learning systems and distance education. That definition, however, appears quite similar to a definition of blended learning, which usually refers to a blend of face-to-face and online learning (Bonk & Graham, 2006). Perhaps, therefore, it would be more convenient to use the term distributed to refer to a distribution of educational experiences, e.g. between institutions and/or online environments. As an example, a student registered at one small high school but taking classes online in other high schools as well could be said to be engaged in distributed learning. On the other hand, a student registered at one school blending online and campus-based delivery within that school is involved in blended learning. However, because schools in Iceland use the term distributed learning more or less as synonymous with blended learning we will do so as well in this paper. Furthermore, since it is often difficult to define where distance learning ends and distributed learning begins we will use the acronym DE for distance education/distributed education.

Method

Study, part 1& 2 – Administrators, fall of 2005 and 2006

In Iceland (a country of about 300,000 people), there are 29 high schools/junior colleges (not counting special schools at that school level, e.g. in arts or horticulture). The schools are at the upper secondary to college level (grades 11 to 14, age of a "regular" student 16-20; in some schools various other programs are available and more used by adult learners). Fifteen schools are in the countryside and 14 in the capital area of Reykjavík. The schools involved tend to be rather young; only six schools were established before 1960 (21%); 23 were established after 1960 (79%) and 21 of them from 1970 or later, see also in Figure 1. Most of the schools have a course-based system, that is, have a core curriculum and electives (22 or 76%). However, seven of the schools have a grade system, with a set curriculum (set classes/groups, "grammar school"/gymnasium) (7 or 24%), which may make it harder to have flexibility in online course offerings. The majority of the older schools are grade based (67%) but only 13% of the younger, see Figure 2.

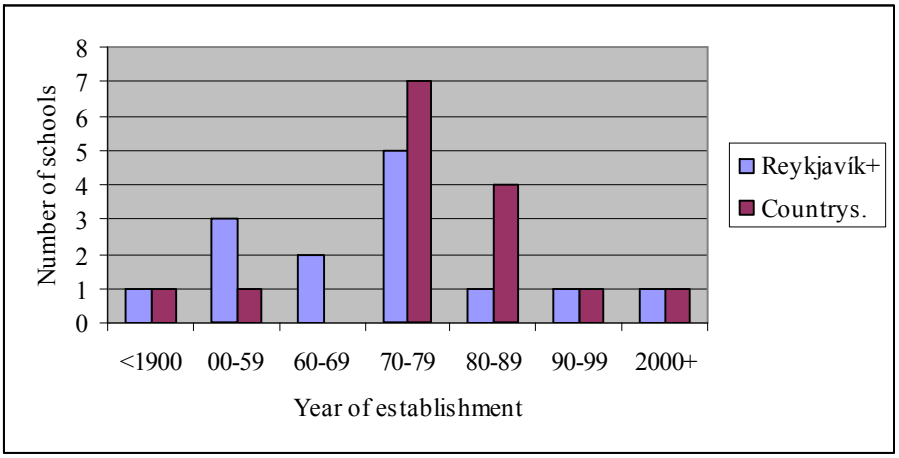


Figure 1. Year of establishment of Icelandic high schools/junior colleges (N=29).

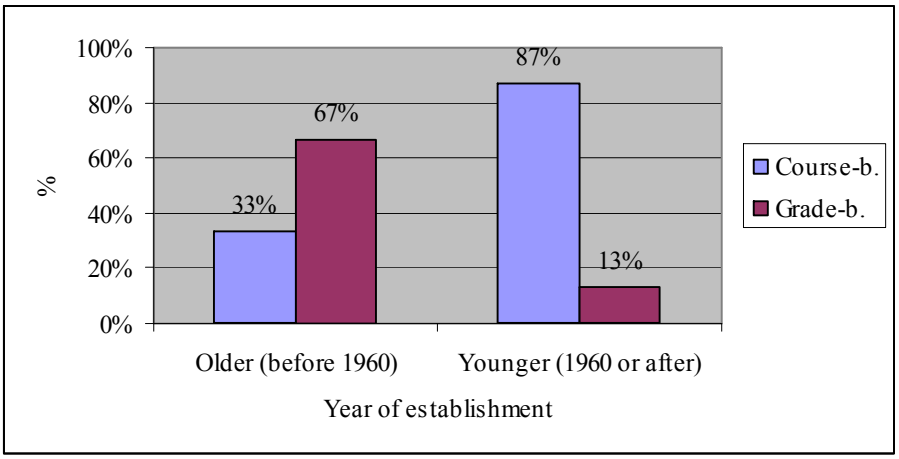


Figure 2. Year of establishment by system (course-based vs. class-based).

Administrators at all 29 high schools/junior colleges were interviewed via telephone in October of 2005 and then again a year later, in October of 2006. The answer rate was 97% in the 2005 study but in 2006 representatives from all 29 schools participated in the study, most often the same people that were interviewed in 2005. The representative from the school that did not participate in 2005 supplied missing information from the school during the 2006 interview. The school representative was usually the principal or the assistant principal in about 71% of the cases in 2005 but 62% in 2006. In other cases, key people linked to distance or distributed learning in the school participated in the interview. In 2005, 36% of the people interviewed were female but 43% in 2006. In addition to the interviews, all school webs were examined, especially their information regarding distance or distributed learning.

The representatives from the schools in 2005 were asked to describe experiences at the school in relation to distance education, distributed education and blended learning and/or use of course management systems and other technical solutions used at the school to support teaching and learning. If the school offered distance learning there were follow-up questions regarding the number of distance learning students, the kind

of groups or individuals involved. They were also asked to describe developments in that regard in the school, opportunities they saw for the school and whether there had been any problems. In 2006, the participants were asked to describe the main developments and changes in relation to distance learning, distributed or blended learning at their schools and/or use of course management systems, since the interviews a year earlier. They were also asked to provide the main reasons for choosing the current course management system the school was using.

The interviewer typed in all answers during the interview into an excel file. The data was then analyzed: coded and classified. The schools were grouped according to how prominent distance and/or distributed education appeared to be within the school. The electronic learning environment schools were providing was mapped as well as other technical solutions; the use of teaching time; and learners and learning.

Study, part 3 –Teachers and students, end of school year 2006-2007

At the end of the 2006 to 2007 school year, eight of the 29 schools participating in part 1 and 2 of the study were invited to participate in a further study and all accepted. The eight school were chosen to get as much breadth as possible, for example, in terms of:

- location (4 schools from the countryside; 4 from the capital area);
- type of school (6 course-based; 2 class-based);
- course management system used (six systems in use in the eight schools involved);
- prominence of distance/distributed learning.

From all of the schools a small group of teachers (usually 5-8) were selected (with different levels of experience of distance/distributed education and/or use of course management system) and invited to participate in the study in April or May of 2007. About 10-15 students were randomly chosen from seven of the eight schools and invited to participate in the study.

The teachers have been and are currently being interviewed individually at their school or via telephone. The interviews are recorded and transcribed and will be coded and further analyzed. So far a group of 47 teachers from eight schools have been invited to be interviewed, 36 (77%) have accepted, 3 (6%) have declined, and the remainder of the group has not answered yet. Nine interviews have been conducted so far.

The students are from seven of the eight schools and have been invited to participate in interviews via MSN or, if they prefer, by telephone. So far about 34 have been interviewed from five schools. The interviews from MSN text chat have been saved, but interviews via telephone typed directly in during the interview. The teachers and students are, e.g., being asked about their experiences and attitudes in relation to distance/distributed learning and/or use of course management systems.

Results

Distance/distributed learning, prominence within the schools

Examination of the school web sites showed that information aimed at students regarding distance learning options could be found on just about one third (34%) of the school websites. Only a quarter (24%) of schools mentioned a specific person in charge

of the program. Titles of those varied and included: a Distance Learning (DL) manager (2 schools); Supervisor of DL; Project Manager of DL; Teaching Supervisor of Distance teaching (DT); DT manager; and Project Manager of distributed education.

None of the schools is a "pure" distance education institution offering DE only and no regular program. Based on descriptions of administrators in 2005 the schools were grouped into five main categories in terms of prominence of distance education and/or use of course management systems or intranet with a lot of variation within each group. The groups can be described in the following ways.

Group 1 - Strong DE "stems": Schools falling in this group had strong DE "stems", i.e., with large groups of students registered in DE, and the DE program even about equal to the regular program. It varied to what extent the DE and the regular program is blended or separated. In 2005 there were four schools that fell into this category: three from the countryside, that had all started their program several years ago, one of them in the Northern part of the country being the first one offering DE online from 1994 and with the most students until recently (ca. 700 in 2005). The other two schools, located in the Eastern part of Iceland, were smaller, and had formed a DE collaboration with another school (in group 2) to be able to offer a better selection of courses with fewer staff members (Jónasdóttir, 2002). However, one school in group 1 was located in Reykjavík (in the southwest of Iceland) which had started later than the others offering DE from 2001 (Matthíasdóttir, 2003). Within a very short time that school had become the largest DE school, exceeding the earlier ones in number of students (up to about 1280 in 2005). Those two schools offered their DE courses online but the other two used video conferencing in addition to online options. In 2006, three schools that had landed in group 2 were moved into this category, two from the Reykjavík area, and one from the countryside.

Groups 2 – Sizable DE programs, but lower percentage of students than in group 1: Schools in this group were about 9 in 2005 but 6 in 2006 (with three schools moving into group 1). They either had a DE program considerable in size in terms of number of students (100 or more) and courses but separated from the regular program and maybe not growing very fast (more bottom-up), or a small program apparently growing at a very fast rate (more top-down).

Group 3 – Regular school program, but DE starting in some ways for groups or courses. In this group were about four schools in 2005 but seven in 2006. They varied a lot. Some of them had started to use course management systems extensively and experiment with shorter school days or fewer regular classes as a result (e.g. 2 schools in 2005). In one brand new school in the countryside (western part) students all came to the school and some of the teachers were located at the school but there were also guest teachers communicating with students online and/or through video conferencing (Pálsdóttir, 2005).

Group 4 (14%) - Use of learning management systems or intranet were in high use in schools in this group by most teachers/student but attendance, length of school day, and schedule was unchanged. There were four schools categorized in the group in 2005 and four in 2006 (not the same), considerable movement in and out. The schools might offer some DE, for example, for individuals (not larger groups) via e-mail (out-of-school for one or two semesters) due, for example, to exchange travels or long term sickness.

Group 5 - Learning management system or intranet in use in most or all schools but not as widespread as in group 4; in some cases many things going on, planning, courses for teachers, sometimes more the grassroot-based development. In this category were about 8 schools in 2005 (more than a quarter of the schools) but only 5 left in 2006.

The results revealed a considerable trend between 2005 and 2006 towards higher use of course management systems and/or DE. As figure 3 shows, the percentage of schools landing in the group 1 (highest prominence of DE) rose from 14% to 24% while the % in group 5 dropped from 28% of the schools to 17%.

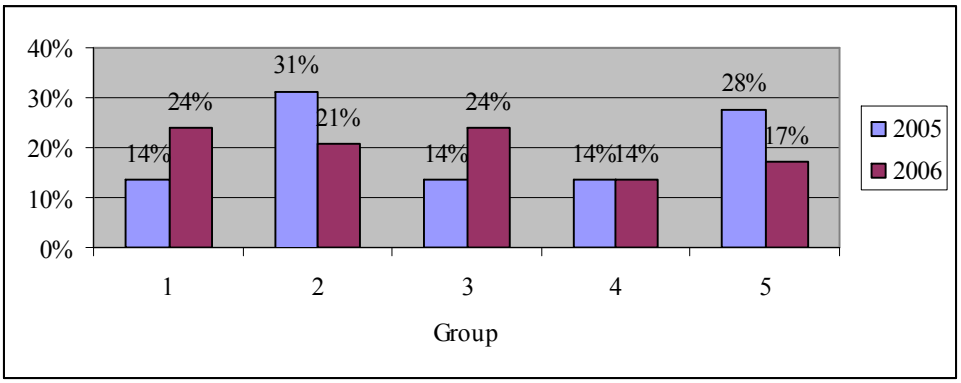


Figure 3. Percentage of schools grouped by prominence of distance/distributed education and/or use of online education. Group 1 (high prominence of distance education) - group 5 (non-existent).

There appears to be a tendency related to course vs. grade-based system. Almost all of the schools with prominent DE are course-based vs. only just over half of schools with less DE.

It was interesting to note that several schools in groups 2 to 5 reported that they had started to change rules regarding time required for regular classroom periods. As an example, there are three schools that emphasize distributed education rather than distance education with fewer meetings required than in regular programs, and a fourth school had started to implement such a program for their first year (called the open classroom; students onsite but not in more project-based learning with less classroom meetings). In one school there was a special program going on with reduced time used for regular classroom periods in selected courses or with selected teachers. In that school all teachers put their courses in WebCT even if there was no distance education. In one school teachers could choose whether they reduced time for classroom periods in the courses they taught. Another school in the countryside with a dormitory had substitute teachers teach online in some courses. Yet another school decided to reduce regular teaching time for the year 2005 and 2006 and also students older than 21 could have flexible attendance. And finally one school with a grade-based system was looking into offering a summer school program online for students that needed to catch up.

Learning environment

The majority of Icelandic secondary schools already use a course management system and many have done so for some time now. A wide variety of established systems are in

use along with a number of custom or home made software solutions. Five established CMS systems occupy the largest share of this market, two of them Icelandic. The distribution of systems is as follows:

- WebCT - 6 schools
- MySchool (Icelandic) - 6 schools
- Angel - 5 schools
- Námskjár (Icelandic) - 4 schools
- Moodle - 4 schools
- Homemade or custom made - 3 schools

A number of different factors influence the choice of a specific learning management system. During the interviews the following reasons were most often cited:

- Icelandic user interface
- Ongoing development and the possibility of customization
- Importing or sharing information with other systems
- TOC (total cost of ownership)
- Time of introduction (some systems entered this market later than others)
- Market share and reported user satisfaction

Summary and discussion

Blended learning is expected to increase access and provide students with more flexibility without sacrificing the social gains of human interaction in the company of peers (Graham, 2006). Also many believe in monetary benefits for institutions utilizing blended learning, e.g. because of less need for housing. Students can also expect monetary benefits from blended learning since they don't have to regularly travel long distances to attend classes far away or even relocate. On the other hand, changes are occurring fast and it is difficult to keep up with them. Hopefully, a friendly regatta can do the schools some good, provided they have time and knowledge to prepare well their crew, boat and oars.

References

Bates, A.W. (1996) The impact of technological change on open and distance learning (The University of British Columbia).

Bonk, C.J. & Graham, C.R. (Eds.) (2006) *Handbook of blended learning: Global perspectives, local designs* (San Francisco, Pfeiffer Publishing).

Graham, C.R. (2006) Blended learning systems: definition, current trends, and future directions, in: C.J. Bonk & C.R. Graham (Eds) *Handbook of blended learning: Global perspectives, local designs* (San Francisco, Pfeiffer Publishing).

Jónasdóttir, S. (2002) Fjarkennsla framhaldsskóla á Austurlandi: Getur leið þeirra verið fyrirmynd annarra lítilla framhaldsskóla? [translated: Distance teaching in upper secondary schools in East Iceland: Can they provide a model for small schools?, *Netla - veftímarit um uppeldi og menntun*, 1(2).

Matthíasdóttir, Á. (2003) Úttekt á fjarkennslu við Fjölbrautaskólann við Ármúla 2001-2003: unnið fyrir menntamálaráðuneytið [translation: Evaluation of distance teaching at the Comprehensive College/Comprehensive Secondary School at Ármúli 2001-2003](Reykjavík, Ministry of Education, Science and Culture).

Ministry of Education Science and Culture (2001) Advantage for the Future: Project plan for e-learning 2001-2003

Pálsdóttir, J. (2005) Frá hugmynd að veruleika: Rannsókn á fyrsta starfsári Fjölbrautaskóla Snæfellinga [translated: From idea to reality: Study of the first year of the Snaefellsnes Comprehensive School/College](Reykjavík, Háskóli Íslands).

Potashnik, M. & Capper, J. (1998) Distance education: growth and diversity*Finance & Development*

Simonson, M., Smaldino, S., Albright, M. & Zvacek, S. (2003) *Teaching and learning at a distance* (Upper Saddle River, New Jersey, Merrill Prentice Hall).

Widening participation: how can new technologies best be used to enhance, learning and teaching and ensure educational inclusion and engagement for excluded groups?

Billy Khokhar
The Open University, UK
n.khokhar@open.ac.uk

Abstract

It is inevitable that the extended use of information technology will bring a revolution in teaching and learning, just as it has brought a revolution in knowledge and its acquisition. This paper is rooted in the need for practitioners to be able to engage in effective e teaching and e learning and that the teaching can be delivered taking into consideration issues of learning pedagogies. Cohen, Manion and Morrison tell us "Technology is transforming society" (Cohen, Manion, Morrison, 2000, p.15). This view is supported in the Journal of Further and Higher Education by Williams who claims," Within Higher Education there is currently a great deal of interest in the new Internet–based technologies and the possibilities that they offer for learning and teaching, particularly in terms of distance learning (Williams, 2002). The Open University recognises this, "For both pedagogic and competitive reasons the OU needs to integrate the use of ICT-based learning and teaching support into its courses and programmes and to promote the development of learning communities and staff" (Open University e learning policy 2006).

The technical elements therein are challenges that have to be addressed both by the institution and the learner. Clark of the Open University states, "E-Learning-properly integrated, delivered and managed expands the Open University's ability to be open" (Clark 2006).

Specifically the aim of this paper is to highlight the potential of open education resources through platforms such as OpenLearn and how these resources can widen participation amongst previously educationally excluded groups. The paper will explore how groups of excluded and disengaged learners may potentially be educationally disenfranchised by e-learning and media but for whom it is a potential conduit to overcome familial, cultural and socio-economic constraints to learning.

Introduction

The use of ICTs is in the process of transforming distance education, in particular post-16 education. In many areas taking courses online is now a viable alternative to studying on site at a University or College. ICT based learning is also capable of putting learning tools of various kinds into the hands of students and teachers, both to broaden and to deepen the learning and teaching experiences during formal periods of study and thereafter.

However, there are many learners who are excluded from engaging in Post-16 Education because of cultural, familial, and economic circumstance and the concept of e learning does not resonate with them or their communities. Many South Asian

communities have generations of women who are disenfranchised and excluded from engaging in any form of post-school education. Their families are not averse to the notion of further or higher education for women but are concerned about the mode and amount of attendance. This attendance also has to be in a perceived safe and culturally acceptable environment. Consequently, these groups have particular requirements and needs that need to be addressed and considered before any long term embedded solutions, or interventions can be implemented. Minton identifies this condition. He explains, "Considerable emphasis is put on identifying needs. It will now be clear that this is not a simple matter. We may distinguish certain needs that arise from practical considerations and are similar for most people within the same situation…..There are other needs which are less tangible or observable and therefore more difficult to analyse, such as confidence, development of a positive self-image, or the identification of our own or others` psychological barriers to learning" **(**Minton, 1997, p.105). Minton's observations of types of need including practical considerations and issues of confidence resonate for this group of learners.

Widening Participation and Inclusion

The notions of Widening Participation are intrinsically embedded in blended learning opportunities. Widening Participation is one of HEFCE`s four core strategic aims and an influential component of policy development in all areas. Race supports this. He explains, "Open learning can help you address accepted national agendas and to hit targets" (Race, 2005, p.29).

This infers that there should be fiscal support available to develop and support blended e-learning initiatives, from initial advice and guidance through to achievement at the end of the programme. Hurley supports this notion of support and inclusion. He explains, "The development of online education provision will contribute to the extension of educational opportunity. The emphasis on lifelong learning entails a substantial widening of access to further and higher education, particularly in respect of the age of students and the variety of ways in which they will be studying….Retention in further education and for distance learning is generally lower than retention in higher education" (Hurley, 2001, p.21). The issue of retention is well observed as students in widening participation groups tend to be part time and therefore more susceptible to external pressures and variables which impact on retention and achievement. This is particularly true of the learners we are discussing, as they tend to have disproportionately higher levels of familial responsibilities through their own immediate and extended families. Hurley goes on to say, "Best practice suggests that guidance and support should be matched to the needs of the student population and be sufficient for that population. This applies particularly to online and distance learning" (Hurley, 2001, p.22). This describes very well the challenge for Institutions to be able to implement e learning into excluded communities in an effective manner that allows them to participate in a supported environment.

The `new` e learning experience needs to be inclusive and relevant to these learners' needs. Walken`s definition of inclusive learning illustrates this well. He says, "Inclusive learning can be defined as, `a means of widening and creating access to learning and training opportunities tailored to meet the needs of the individual' " (Walken, 2000 p.60).

However these groups may be able to access materials from home, which is seen as the safest, least expensive environment. This could be incorporated with occasional attendance at local study centres and a form of blended learning incorporating open education resources such as OpenLearn can be maintained. Hurley describes very well a potential scenario of the possibilities of on-line learning programmes, "Local provision is made available by a provider within a local area, typically through drop-in learning centres, community–based learning centres workplace learning centres or at home" (Hurley, 2001, p.15). This is the platform to allow blended e-learning to take place for excluded groups, as the technical element of learning is localised thus making attendance for tutorials or technical guidance during a programme less of a barrier. Hurley points out, "If community access develops as predicted, then some guidance functions will need to be located at the community learning centre. What is difficult to avoid at some stage is the personal contact upon which mutual confidence is built" (Hurley, 2001, p.66).

This highlights the value of having localised interventions and also the sensitivity with which tutors have to implement and maintain the blended learning element. It is unavoidable and, therefore, both teachers and learners and their families need to be psychologically amenable to this engagement. E tutors have a responsibility to engineer and maintain a supported environment that reflects the learners' different learning styles. Indeed Race suggests that the e tutor should get to know their learners and how they learn, "…However, even if you don't meet them it is surprising how quickly you can get to know at least some of them. Even when communication is restricted to written comments or e mail communication, some people are easy to get to know" (Race, 2005, p.122).

The inference is that the tutor has some responsibility to create a positive learning environment. Laurillard (2002) describes the process of teaching as, "a conversation between teacher and student focussed on a topic. The responsibilities of the teacher and student during this dialogue are described by four teaching strategies; discursive, adaptive, interactive and reflective" (Laurillard, 2002, p77). She explores how these strategies can be complimentary and synergous between new learning media and their capability of supporting academic learning.

Learners can also have input in setting the agenda of content in the online engagement within the broad generic remit of the prescribed syllabus. This is supported by Hudson, Maslin-Prothero and Oates, "Flexible learning is essentially student-centred learning, and is about meeting student needs using whatever methods of teaching and learning are most appropriate" (Hudson, Maslin-Prothero and Oates in Tight, 2002, p.104).

There are issues to consider here. The first is the technical engagement through open education resources such as OpenLearn and the difficulties this might present. Another is the use of other electronic media such as DVDs and applications such as the use of blogs, texts, and other modes of contact, the effective use of which can be almost impenetrable for certain learner groups. Rosenberg tells us that, "Online training is just one part of e learning. We need to be vigilant about the quality and best use of technology. We must be smart enough to know when online instruction is warranted and when it's not…The new framework for e learning, enabled by the web, is about online training and knowledge management interacting with each other" (Rosenberg, 2001, p.62).

Barriers to E Learning

The following seven points by Vrasidas illustrate very well the barriers in place to e learning

- Lack of skills and knowledge needed to design and teach online classes
- Lack of support, training and help needed for planning online instruction
- The lack of face-to-face contact violated the culture of traditional teaching and raises concerns among teachers
- Lack of appropriate design and development tools that will help faculty to easily plan and deliver online instruction
- Lack of solid technology infrastructure
- Lack of time to plan, design, and teach online
- Lack of incentives and compensation needed to motivate faculty to teach online (Vrasidas, 2004, p.911).

It is useful to note that many of these are institutional barriers, and that these need to be overcome before the needs of learners with distinct requirements can even begin to be addressed.

As a counterpoint to this are the barriers that learners must face as their role changes within this technological framework. Forsyth tells us, "With course materials on the internet, the role of the learner changes from one of primarily being a recipient to one of being a participant….Just as the teacher will have to learn new tools, the learners will also have to use new tools if they are to fully capitalise on using course materials and related sources of information on the internet" (Forsyth, 1998).

Therein lies a dilemma for the Institution and the learner, as there are issues of preparedness of the learners that need to be addressed to allow them to be able to engage successfully and not drop out because of technological and social limitations.

OpenLearn

I feel the Open Content response from the Open University is a pedagogically sound intervention in that it strives not be assumptive or pre-suppose the student's ability to learn via this platform. The package has built into it ongoing evaluation to capture the pedagogical and practical implications that impact on the student's ability to learn effectively. Macdonald illustrates the need for clarity in e learning pedagogical design and platforms, "It is time we looked at good practice in online tutoring in the context of what we know about our students, what else we do with them, how we support them, and what other opportunities they have from learning from each other" (Macdonald, 2006, p.2).

This is where the OpenLearn programme is an effective initial response for these students. By integrating materials that are replicable across differentiated fora, an enhanced learning experience is possible for students. There is then the possibility of greater personalisation through appropriate media and OpenLearn begins to facilitate this. Mayer explains, "The promise of multimedia learning is that students can learn more deeply from well-designed multimedia messages consisting of words and pictures

than from traditional modes of communication involving words alone" (Mayer 2002). MacVay supports Mayer by explaining, "With respect to the future of technology in distance education, the overall trend is to diversification, increasing functionality and overlapping modalities" (MacVay, 2000, p.92). However this must be directed by pedagogies based on a cognitive student-centric approach and not led by technology. The challenges that institutions face are in designing e-learning interventions that are pertinent to learners' conditions and circumstance. The pedagogies have to be considered so that a synergous, coherent use of new technologies allows the learners to engage effectively.

The motivations for implementing an e-learning resource such as OpenLearn can be described within distinct scenarios. So what are the student/pedagogic benefits?

- The provision of a rich set of e learning tools within a single environment will enhance the online learning experience and support a range of pedagogies. There are distinct pedagogical scenarios that are feasible for this particular group of students. OpenLearn does support synchronous collaboration and also allows students to manage their learning, by structuring the activities they undertake. There is a concern here relating to the ability of these students to be able to engage with the technical elements required and this has been to be taken into consideration in the design and evaluation of OpenLearn.

- Another scenario is Instructor-led and one that I feel is also feasible in this context. This is an information-transfer, didactic or instructivist approach. This is the model closest to the traditional mode of education and the one that our learners would be most familiar and comfortable with. This is the model which we have used to initially facilitate the use of OpenLearn in our local study centres.

- Through OpenLearn the student experience is streamlined and there is commonality and consistency of presentation across all courses, resulting in less time spent learning new tools, interfaces or approaches. (This is particularly important for the future preparedness of these learners as it would give confidence to progress in Higher Education through e learning platforms without `fear` of the technology.)

- The ongoing analysis and evaluation of OpenLearn data can help to improve student retention, by indicating trends and behaviour patterns that may suggest issues or concerns and allow e tutors to support effectively and in time.

The use and design of open educational resources needs to reflect the pertinent needs of different socio-economic and ability groups. Obviously much of this is driven by curriculum imperatives and requirements. The excluded groups may feel that is their only feasible, acceptable mode of study and, therefore, VLEs and online engagement should be designed to meet the needs of each group that is required to support. Race points out that this can be problematical. He says, "One of the problems with too much of the present day e-learning provision is that it's not *really* e learning, but rather *e information*; information flows electronically to learners screens and disks very efficiently, but does not necessarily get processed equally efficiently into *knowledge* inside their brains!" (Race, 2005, p.9). This highlights the importance of thought in the design that reflects learners' needs and also what designers need to consider when creating materials.

There is a coherent argument that distance based learning has both an economical imperative for institutions and learners and is also a concrete form of social justice for disengaged communities. Can the use of new technologies be a conduit for learning, inclusion and achievement or are internal and external barriers insurmountable? In one response to this question, Salmon (2000) cites the work of Benjamin (1994) who has an optimistic view of teaching and learning online, "Every learner can at his or her own choice of time and place, access a world of multimedia material…immediately the learner is unlocked from the shackles of fixed and rigid schedules, from physical limitations…and is released into an information world which reacts to his or her own pace of learning" (Benjamin in Salmon, 2000, p.11). I suggest that this assumptive theorising is problematical but widespread among the thinking of institutions as it presupposes the psychological and physical acceptance of new technologies and the ability to effectively engage with them in all groups of learners.

Gordon and Bull (2004) cite Martinez (2000) who describes the condition of distance learners. Martinez suggests, "Possible reasons why a learner may be unwilling to participate in the learning process in an online environment,

- They may lack the ICT skills to interact effectively with e learning materials
- They may lack the self-confidence to use ICTs effectively, or
- They may not wish to participate in the learning experience because they are apathetic. Frustrated, unable, discouraged, or disobedient" (Martinez in Gordon and Bull, 2004)

Therein lies the inherent tension for these students. On the one hand they are excluded from mainstream education and on the other they have difficulties with the new technologies and dynamic of online learning. However, most are driven by their desire to be able to access education in whatever viable form is available.

The Learners' perspective

Many of these students have had no engagement with learning since leaving school so their only experience is of the traditional classroom based interaction. This leaves them vulnerable psychologically and resistant to the online mode of delivery which is regarded as an alien concept. Salmon explains, "Many students are concerned about working online. They see reduced social contact in learning contexts as a real threat. They are anxious about the lack of stimulus and fun from their buddies and on the potential loss of a special relationship with their teachers, trainers and professors" (Salmon, 2004, p.5). However, for the learners we are discussing they have no alternative to online distance learning and previous notions of classroom-based engagement have to be psychologically and physically discarded.

There are major difficulties which impact on the efficacy of e learning which, for many learners, could be contextualised as a deficit model. An initial concern is institutional as the providers often seem incapable or unwilling of changing their modus operandi and remain entrenched within prescriptive rigid parameters of engagement. Learning providers should concern themselves with the mastery of the pedagogic applications and research the use of current ICTs for a wide variety of learning purposes. The `one size fits all` model is short-sighted. Providers may argue that there are external drivers

which predicate change and therefore are not possible. These drivers may be curricular, such as verifying, assessing, materials and quality assurance issues.

So what are the possibilities in embedding informed blended learning in these communities and what are the potential difficulties? Huang theorises "Since online learning has a different setting from the conventional classroom, online educators need to use some special techniques and perceptions to lead to success. Moreover, adults have special needs and requirements as learners compared with children and adolescents, thus online educators should know how adults can learn best because of their special characteristics" (Huang, 2002, p.27).

Vygotskyist thinking suggests that learning is a social construct and learning is enhanced with the interaction between learners and that this interaction is a necessary and contributing part of the learning process. This is in contrast to Kant, who suggests that learners have their own representation of knowledge that is based on their personal experiences. I feel that perhaps Piaget has the best representation of this learner group, as he espouses that people learn through active exploration and that learning occurs when the learner's exploration uncovers an inconsistency between their current knowledge representation and their experience.

Conclusions

I have introduced the learners, and the issues and barriers that they are faced with, both personally and educationally. I have examined the real and perceived barriers to e learning and the types of effective institutional responses that can be implemented. I have explored the different types of learning and pedagogical scenarios that are possible and how institutions and learners could employ them in e learning scenarios. It is incumbent upon institutions and course developers to ensure that new technologies are transferred from being a largely unconnected non-synergous set of applications to a coherent symbiotic integrated environment with a feasible commonality in style and purpose. VLEs such as OpenLearn, for example, must be adaptable to changing pedagogic needs and technological possibilities. This should drive the need to address the technical requirements of learners who will be new to e-learning concepts and programmes and also examine the physical implementation of ICT within excluded communities.

The DfES e strategy paper (Harnessing Technology Transforming Learning and Children's Services, 2005) reveals the Governments thinking on the future of e learning and should be the institutional driver for the e learning strategies they adopt. It is forward thinking and progressive. It states, "Adult learners will have more choice of courses and learning programmes, including Skills for Life and 'first rung' access courses for those from disadvantaged groups. They could choose a college or a community setting, such as a public library, or study at home online with tutor support. Many institutions will mix formal classes with online teaching. Some people will use ICT to manage their own learning at their own pace, using e-assessment to monitor their own progress." This is a reassuring vision, however one that has to be resourced adequately if it is to be embedded in a learning society.

References

Cohen, L. and Manion, L. (1994) Research methods in education. 3rd Edition, London: Routledge

Department for Education and Skills (2005) `*Harnessing Technology: Transforming learning and children's services*` 1296-2005DOC-EN, Nottingham: DfES Publications

Forsyth, I. (1998) Teaching and Learning Materials and the Internet, 2nd Edition, London: Kogan Page Limited in MSc Multimedia and E-Learning Course Reader, (2005/6) University of Huddersfield: School of Education and Professional Development

Huang, H-M. (2002) `Student Perceptions in an Online Medicated Environment` in British Journal of Educational Technology (2002) ` *Towards constructivism for adult learners in online learning environments*` Vol 33 No 1, p 27

Hurley, J. (2001) Supporting Online Learning, Gloucestershire: Learning Partners

Kember, D. (2000) action Learning and action Research, London: Kogan Page

Lankshear, C. and Knobel, M. (2004), Berkshire: Open University Press

Martinez, M. (2000) Successful Learning: Using Learning Orientations to Mass Customize Learning: IJET in Gordon, D., Bull, G (2004) `*The Nexus Explored*: A Generalised Model of Learning Styles`, Dublin: Dublin Institute of Technology

Minton, D. (1997) Teaching Skills in Further and Adult Education, London: Macmillan Press Ltd

Open University: e-learning at the OU: Overview http://www.open.ac.uk/elearning/p2_1.shtml

Race, P. (2005) {500 Tips} for Open and Online Learning 2nd Edition, London: RoutledgeFalmer

Rosenberg, M.J. (2001) e-Learning, London: McGraw-Hill

Salmon, G. (2005) E tivities, London: RoutledgeFalmer

Salmon, G. (2000) E Moderating, London: Kogan Page

Tight, M. (2002) Key Concepts in Adult Education and Training, London: RoutledgeFalmer

Vrasidas, C. (2004) `Issues of Pedagogy and Design in e-learning Systems`, *ACM Symposium on Applied Computing,* p.911

Technological constraints and implementation barriers of using videoconferencing in rural secondary schools: Some observations from the OtagoNet Project

Kwok-Wing Lai and Keryn Pratt
University of Otago College of Education
wing.lai@otago.ac.nz

Abstract

A study was conducted between 2001 and 2004 with nine New Zealand secondary schools that were participants of a videoconferencing project called the OtagoNet. Findings from this study show that while videoconferencing provided opportunities for rural students to enrol in courses they had only been able to take by correspondence previously, there were technological and implementation barriers associated with the use of videoconferencing that would affect pedagogy and teaching styles. Also, the use of videoconferencing in and of itself does not necessarily increase teacher-student or student-student interactions, which was the main benefit associated with the use of this medium.

Introduction

While increasingly videoconferencing has been used in the last 10 years in secondary schools and, more recently, in kindergarten and primary settings using IP (Internet Protocol) videoconferencing (Heath and Holznagel, 2002), there is insufficient research to document its effectiveness (Anderson and Rourke, 2005). Cavanaugh (2001) conducted a meta-analysis study on K-12 use of videoconferencing and found that generally achievement levels did not differ to those experienced in face-to-face teaching, but this was based on only 19 studies.

Interactivity has been identified as crucial for successful learning in distance education (Zhao et al, 2005) and videoconferencing has been compared favourably to traditional correspondence studies for its potential to increase interactivity among students and between students and teachers as it increases the bandwidth of communication (Motamedi, 2001). In addition, students and teachers are able to videotape the videoconferencing sessions, allowing teachers to critique their teaching and students to 'attend' sessions they had missed and/or replay sections they did not understand (Downs and Moller, 1999). Videoconferencing has been used to deliver distance education to rural students where there is a shortage of specialist teachers in senior level subjects (Anderson and Rourke, 2005).

There are implementation barriers in using videoconferencing technology for course delivery. Barriers to implementing teaching via videoconferencing are related to physical factors, as well as factors related to the students, the teachers and the school management. Physical barriers to using videoconferencing include the cost of buying, operating and maintaining the technology, as well as dealing with the inevitable technical problems (Downs and Moller, 1999). The technology used often limits the number of sites and the number of students within each site who can be taught, while the room in which the class occurs also affects the quality of the lesson (Searle and

Mandile, 2003; ViDe et al, 2004). Students and teachers who are involved in videoconferencing classes need to be motivated and enthusiastic about it, as well as being able to cope with being on camera (Searle and Mandile, 2003). Teachers have to be more organised and prepared for lessons delivered via videoconferences, with preparation for this type of lesson taking longer, and delivery of it being more tiring than traditional lessons (Downs and Moller, 1999). Teachers also need to understand the nature of the videoconferencing technology as it has an impact on pedagogy and their teaching styles and to ensure that their teaching is not driven by the use of the technology (Kinnaman, 1995; Motamedi, 2001). The management of the school also impacts on the implementation of videoconference classes. There are issues associated with scheduling classes across different sites and ensuring class sizes are not too large (Downs and Moller, 1999; ViDe et al, 2004). In addition, the commitment of the management team at the school will impact on the videoconference classes (Salvati, 2001). Just like using any technology in teaching, videoconferencing is not a panacea for the shortage of specialist teachers in rural areas and its use may have both positive and negative implications on teaching and learning.

The purpose of this paper is to document some of the implementation barriers (Anderson, 2002) which have been imposed on the use of the videoconferencing system in the OtagoNet project, implemented in New Zealand from 2001, with research being conducted between 2001 and 2004. In particular, this paper explores how technology has driven pedagogical decisions, and how teachers' teaching styles have been affected by using this new medium to teach.

The nine schools involved in the OtagoNet project at its inception were all located in the Otago region of New Zealand. Five of the schools involved were area (Year 1-13) schools and four were provincial (Year 7-13 or 9-13) schools. Between 2001 and 2004 thirteen Year 11-13 courses have been taught using the videoconferencing system, by 14 teachers. A total of approximately 150 students attended these classes. The class sizes were small, ranging from 1 to 16. The majority of the classes involved two sites (including the home site) but a few linked up to four sites.

All the participating schools were provided with the essential hardware for videoconferencing, i.e., a television, a document camera, and one videoconferencing camera/microphone system, housed in a room chosen by the school. The videoconferencing network was connected as a VPN (virtual private network) via the Internet. Some schools also provided additional peripheral equipment, such as a video player. Many of the teachers took their own laptop computer into the room to use in the videoconference session. The system allowed a teacher to teach her local class, and up to four other remote classes at the same time. It also allowed teachers to choose whether students could see all the sites, the teacher, whichever site was talking, their own site, or a combination. When video or computer presentations were being shown on the TV, students in the remote sites would not be able to see their teacher or classmates at the other sites.

Teachers took a range of approaches to how they taught their distance students, including (a) simultaneously to all participating sites, with no local students; (b) simultaneously to all participating sites, with onsite students being taught at the same time; and (c) to each local and remote school separately. Most teachers also scheduled videoconference tutorials for their students, while some teachers occasionally travelled

to the remote sites to visit their students. After the first year of the project it was felt there was a need for face-to-face contact, and it was decided to bring students and teachers together twice a year. The first face-to-face session usually took place early in the year to provide a chance for students and teachers to meet each other and for students to learn how to use the equipment. The second session was scheduled for the third term and was used mainly for practical assessments. The OtagoNet project was supported by the Community Trust of Otago, Telecom New Zealand and the Ministry of Education. Funding and technical considerations only allowed each course one videoconferencing session (50 minutes) per week.

All the teachers involved in the project were invited to participate in the interviews at the beginning of the project, the end of the second year, and the end of the third year/beginning of the fourth year. Principals and teachers designated as support staff for the project were also invited to participate in the research. A total of 26 staff were involved in the study, with 5 teachers, 3 principals, and 2 support teachers being interviewed once, 2 teachers, 4 principals, and 3 support teachers being interviewed twice, and 5 teachers and 2 principals being interviewed three times. A total of 49 interviews were conducted, with many of them being conducted using videoconferencing. The interviews on average lasted about an hour and they were all transcribed. A qualitative software package, Nud*ist, was used to assist coding and analysing the data. Themes identified from the interview transcripts, primarily from the teachers, are reported in the following sections. Other aspects of the OtagoNet project have been reported elsewhere (Lai and Pratt, 2005).

Expectations affect implementation

While there was a general feeling of "anticipation, excitement, [and] it's going to be really interesting", and that the use of videoconferencing would increase student and teacher interaction, it was evident during the training sessions that teachers and principals initially did not have a good understanding of how to use this technology to support teaching. They were more concerned about coming to terms with the technology than the constraints this technology could impose on their pedagogy or teaching style. They were certainly not aware that videoconferencing might provide "less accessible and leaner interaction between and amongst teachers and students due to the inherent technological distance between students and teachers imposed by the mediating technology" (Anderson, 2002, n.p.), or that they may not be able to "detect and take advantage of the teachable moment, or to perform the on-the-fly qualitative assessments of individual students so important to good teaching" (Kinnaman, 1995, p. 58).

What the majority of teachers in this study believed was that this technology could "extend the opportunities available to kids" (Teacher A), and that

> "eventually [videoconferencing] is going to affect all our schools as far as being able to offer the range of subjects than what they're offering now and the students are going to get a better deal collectively…have the same subject choices that they would get in a big city school" (Teacher B).

A similar view was expressed by a principal, that the videoconference system could

> "deliver a whole range of courses much more effectively than we could before…our students will benefit [from the] daily contact through email and fax, telephone with their tutor. They will feel more identified with their tutor than they do currently…if they have face to face with that person, once a week, then it just adds a personal touch there and if we can bring them together as a group collectively, then we can get a class feeling…" (Principal A).

For most teachers, the use of videoconferencing technology was not a huge barrier, and they didn't reflect deeply on how the technology could constrain pedagogy. There was a sense that the key concern was to know how to operate the equipment, with the rest being natural, given their teaching experience. The following is a typical comment:

> "I can still draw on the whiteboard…question people…I can draw with the document camera and he can see that so I can do the fine work with him and he can put his work and I can see…it's just a few minor adjustments" (Teacher A).

Only one teacher questioned the value of using videoconferencing for teaching and suspected that the project was market-driven and politically motivated:

> "this sounds like the money is there and it's easy enough to explain the concept and make it sound advantageous to everyone but I'm cynical about the overall picture…we had this big sell…it was just like propaganda…you could say it's advantageous to the kids…the government could sack all those other teachers they don't need…can save money…not just to help kids" (Teacher C).

Throughout the initial interviews, there was little evidence to show that teachers had reflected deeply on the implications of using videoconferencing in their teaching. The question of how videoconferencing can or cannot support a more student-centred pedagogy has not been asked. In the initial interviews, teachers seem surprised at questions asked about pedagogy, as they could not see how the medium would affect this.

"Upfront teaching" to deliver information

There was evidence in this study that the use of the videoconferencing technology did impose constraints on teaching in a number of ways. For example, the need to use the document camera and the microphone has constrained the movement and participation of the teacher and students, thereby limiting pedagogy to traditional delivery of information (Bromley, 1998). As mentioned by most teachers, there was a need to engage in 'upfront teaching'. One teacher commented in the first interview:

> "there's going to be a lot of upfront teaching...I am not going to use the video conferencing like you would go and talk to kids normally in class" (Teacher A).

Because of the lack of access to the videoconferencing network, teachers were given one 50-minute session a week to cover the course when in a conventional class four 50-minute sessions would be given. As such, teachers felt it was imperative for them to organise the class to make the best use of the videoconferencing time. As commented by one teacher:

> "if you've only got one session a week, you're not going to waste your time getting them to spend 15 minutes doing a task while you're sitting there doing nothing…it's got to rely on the kids being independent or coming back with their own questions, stuff they haven't understood from the previous week" (Teacher C).

The teachers spent most of the videoconferencing time talking, presenting the information they felt students needed to know for that week. Having a class discussion or other class activities was seen as a waste of time.

> "I just did a Physics roadshow for an hour so I did demonstrations, experiments, whatever was relevant to the topic we were doing…with very little activities for the kids to do because to stop and let them do something for a quarter of an hour, just seemed a waste of that hour…when you've only got one hour a week" (Teacher E).

This comment reflected the concern of the teacher to 'cover the content', and thus using videoconferencing to supervise students' work or allowing discussion was considered inefficient and ineffective. This did change, over time, for some of the teachers.

Teacher-centredness

The need for carefully organised sessions to cover the subject curriculum means that videoconferencing may even be more teacher-centred than traditional teaching in secondary schools. As reflected by a physical education teacher:

> "I probably spent most of the 50 minute teaching period…totally me centred…I felt I reverted back to…in the front all the time and I felt it was back to the old teacher talks stuff where I directed everything from the chair here…that worried me a little bit because I had moved quite away from me being up front to more being a facilitator in a gym" (Teacher I).

To make teaching more efficient, content and teaching materials have to be "pre-packaged":

> "I'm sending them material, giving them notes to read…the Friday session is going over that, checking things they don't know…more delivery than anything" (Teacher H).

In teaching mathematics, for example, one teacher lamented that problem solving couldn't be done on the spot, and trial and error wouldn't be allowed. There was an implementation barrier to model how problem solving would take place in the real world.

> "I've had to work through all the problems and make sure that I could get straight to answers because…it's perfectly okay in a normal class to get stuck on a question and then work with the students to try and find the answer but videoconferencing, you don't have the time to do that sort of stuff, that sort of trialling. So I'd go through and answer all the problems before I got there and

> make sure I could explain everything as clearly as I could as preparation for my lesson" (Teacher F).

While the videoconferences could be "teacher driven", some teachers were aware of its limitations and tried to be less teacher-centred in the second or third year of the project. As commented by one teacher, in the second year of the project:

> "I'm becoming more conscious now of not talking the whole time during the videoconference…I've tried more to get the kids to interact…among themselves during the videoconferences" (Teacher J).

Similarly for another teacher:

> "At the beginning I used to, we used to go through the notes together more whereas now they've got the chunk of notes there and can just ask questions about extra things…they basically do it themselves, but they bring any questions that they've got" (Teacher K).

Also, one teacher did use the videoconferencing system to design a more student-centred learning environment:

> "I've got a sixth form computing class so two weeks ago for their final assessment, what the kids had to do was to make a short digital movie, edit it on a computer, add all the effects…they had to do a videoconference with [their friends] like they were selling a promotional video and they played out a role…they would be marked on how they used all the equipment. So it changed the way I taught" (Teacher C).

So while technology could impose certain constraints on teaching, teachers could find ways of working around these constraints if they were aware of these limitations and were not controlled by them.

Lack of interaction and feedback

There was an expectation from the participants that the use of videoconferencing would improve interactions, compared to the correspondence courses students used to take. For example, when a principal was asked what advantages videoconferencing had over correspondence study, she said, "because they've got that interaction" (Principal B). According to another principal, "I believe it must be better to deliver a system where you can talk with the person that you are involved with rather than just a pen and paper exercise" (Principal C).

Findings from this study support Anderson's (2002) notion that distance technology may not support social interaction effectively. In the OtagoNet, in order to maximise course offerings, courses were taken by students from more than one site, and normally it consisted of a home class and a remote class. However, teaching both classes simultaneously created problems for some teachers. Most teachers found that they concentrated on the remote students to the exclusion of their local students. For example, one teacher who had nine students in the home class and four in the remote class found teaching a videoconferencing class with local students around difficult. He

ended up teaching these classes separately, with the videoconferencing class running first, and being used as a testbed for the teacher. In another case, in a computing class, the teacher had one computing student in the remote site but thirteen students in the local class. The teacher tried to involve the home students in the videoconferencing session but was unsuccessful. So in the videoconferencing session it was basically a one-on-one teaching. According to this teacher, if he had a smaller group of home students it might work. Two other teachers concurred by saying that when the local class was big (with more than ten students), it would be difficult to hold the videoconferencing classes simultaneously with local students. However, even with a smaller local class, in one case, with three local students and two from one remote site, the teachers chose to teach the two classes separately. In these cases, whether it was cost-effective to teach the home and remote classes separately has not been considered as teachers have practically doubled their workload.

According to some teachers, it was not that easy for students in two remote sites to have any meaningful interactions with one another during the videoconferencing sessions. One of the teachers in the study chose to teach students from two remote schools separately, which severely limited interaction as each class would only have 30 minutes of videoconferencing time per week and the teacher "had to get so much information across to them and they had so many questions that needed to get answered". The teacher considered that it would be hard to encourage interaction between the two sites even if they were taught together when "they know that their picture is being broadcast to another school…It was just easier to talk to just one school at a time". Another teacher, who also had two remote classes and one local class, with the same number of students in each class, chose to teach all three classes together. But it was difficult for her to get feedback from students as "there was no real way of finding out what they really knew because even though you'd ask them, they'd sort of explain and it was hard to hear" and she felt that she had no control over anything that was going on and "you just kind of felt powerless" so she just kept talking most of the time. Teachers didn't know exactly what was going on during the videoconferencing session as they did not have direct contact with the students and in a multiple-site situation they could only see students located in one site at a time. This could make teaching in a videoconferencing environment quite impersonal.

> "In a classroom situation where you can be quite personal…have a few laughs with them…that's very difficult in this format because they're very sensitive. They didn't like getting [zooming the camera] in too close but they were always so far away that I couldn't make out anything personal with them. It was too distant" (Teacher C).

Again, we found evidence in this study that teachers could find ways to overcome the constraints imposed by the technology. For example, an electronics teacher whose subject required a lot of hands-on and practical work was initially concerned about how he could effectively communicate with his students. Besides his local class (two students), he used videoconferencing to teach students in three other schools (two students in one school, and one student in each of the other two schools). At the beginning of the first year he found it difficult to interact with the students:

> "I found it very difficult because you don't know who's talking at the other end…with just one school it would be easy because you're one to one

> through…You're talking to a blank wall…a loss of feedback from the class that I find…you're sort of working, you're talking to them but you're not…very disjointed, especially when the sound's off" (Teacher H).

When this teacher was interviewed again at the end of the year, he was happy with what his students have achieved, and was enthusiastic about the project. The lack of immediate feedback to students was a problem but he found ways to overcome this implementation barrier:

> "Actually meeting the kids…via this medium was not easy…there's no body language feedback via this medium…It's only the person I'm directly looking at and the rest of the class being on another channel, as it were, I miss. So I've had to modify that a bit and go around each kid individually and say did you get that. That takes a lot longer than a group…" (Teacher H).

He also tried to interact with the students and make the teaching less boring:

> "I do try to put some practical work into each [videoconferencing] hour so that [students] are having their input as well. We've had 32 periods and I'd say there'd only be a handful of those that we haven't actually done something practical" (Teacher H).

Teaching has to be adapted to the technology and fitted into the set up of the equipment. For example, for this electronic teacher, in using videoconferencing,

> "you need to be far more organised than a normal classroom…you've got to have all that material there on hand because you just simply can't get up and wander off to get something. The other thing you can't really let the kids sort of wander off to do something…It is a very intensive session so you've got to be highly prepared" (Teacher H).

Conclusion

While it is evident that videoconferencing in the OtagoNet project has provided senior secondary students in the Otago region the opportunity to enrol in courses that they would not have been able to do previously, it also has imposed certain constraints to teaching in this learning environment. The limited amount of videoconferencing time meant that teachers had to spend more time in planning and organising the videoconferencing sessions to deliver the course content, and to adapt their pedagogy to this new medium of teaching. Teaching by videoconferencing could be highly instructionist and teacher-centred in approach. Videoconferencing has been considered a better option for students than the traditional correspondence courses, due mainly to the increased interaction. Although students and teachers involved in the OtagoNet project believed the use of videoconference was preferable to traditional correspondence courses, due mainly to the increased interaction, it was not clear from the interviews how videoconferencing in itself has improved interactivity among students and between students and the teacher. In this project, the increased interaction may largely have been a function of having local teachers involved in the remote classes, which increase the opportunities for face-to-face contact.

This project was seen by the principals, teachers and students involved as providing a much more effective and enjoyable learning experience than correspondence courses. The one success factor highlighted in this study was the teacher. Even though the videoconferencing technology has imposed some constraints to student-centred learning, teachers could find ways to work around these constraints. It was not really the technology that made the project work but the extra work put in by the teachers and their enthusiasm that made the project a success.

References

Anderson, T. (2002) *An updated and theoretical rationale for interaction*. Retrieved April 27, 2007, from http://it.coe.uga.edu/itforum/paper63/paper63.htm

Anderson, T. & Rourke, L. (2005) *Videoconferencing in kindergarten-to-grade 12 settings: A review of the literature*. Athabasca, Canada: Athabasca University.

Bromley, H. (1998) *What to ask about technology (or…and now for something completely different)*. Retrieved April 27, 2007, from htp://itech1.coe.uga.edu/itforum/paper29/paper29.html

Cavanaugh, C. S. (2001) The effectiveness of interactive distance education technologies in K-12 learning: A meta-analysis. *International Journal of Educational Telecommunications,* 7 (1), 73-88. Retrieved March 3, 2004, from http://www.unf.edu/~ccavanau/CavanaughIJET2001.pdf

Downs, M. & Moller, L. (1999) Experiences of students, teachers, and administrators in a distance education course. *International Journal of Educational Technology*, 1 (2), Retrieved 8 March, 2004, from http://www.ao.uiuc.edu/ijet/v2001n2002/downs/index.html.

Heath, M. J. & Holznagel, D. (2002) *Interactive videoconferencing: A literature review*. Paper presented at the k-12 National Symposium for Interactive Videoconferencing, Dallas, Texas.

Kinnaman, D. E. (1995) The future of distance education. *Technology & Learning,* 15 (4), 58.

Lai, K. W. & Pratt, K. (2005) OtagoNet: A videoconferencing network for New Zealand secondary students. In *Proceedings of the 8th IFIP World Conference on Computers in Education*. Stellenbosch, South Africa: CD-ROM.

Motamedi, V. (2001) A critical look at the use of videoconferencing in United States distance education. *Education*, 122 (2), 386-394.

Salvati, J. (2001) Reflections on a 10 year distance learning project: NYClassnet. *Education,* 122 (2), 276-282.

Searle, G. & Mandile, F. (2003) *The virtual school service dance to a different tune*. Paper presented at the Learning Technologies Conference 2003, Mooloolaba, Queensland, Australia. Retrieved March 3, 2004, from http://videolinq.tage.net/learning2003/paperspdf/Searle_Mandile_paper.pdf.

ViDe et al. (2004) *Videoconferencing cookbook*. Retrieved June 11, 2004, from http://www.videnet.gatech.edu/cookbook/.

Zhao, Y., Lei, J., Yan, B., Lai, C. & Tan, H. S. (2005) What makes the difference? A practical analysis of research on the effectiveness of distance education. *Teachers College Record*, 107 (8), 1836-1884.

The contributions of ODL to teaching and learning: what we have learned

Helen Lentell
The University of the South Pacific
Lentell_h@usp.ac.fj

Abstract

This paper takes it to be axiomatic that distance education is a means of providing education and learning that utilizes technology to bridge space and time. The paper begins by noting the increasing wish of policy makers to orientate higher education towards learning as opposed to instruction. The paper argues that the legacy of ODL to teaching and learning is much deeper and wider than any particular technological application. It argues that ODL of necessity had to concern itself with learning and defined successful learning as student centered. Good practice in ODL demonstrated that successful courses are those that are well planned, with all aspects - from learning outcomes to assessment, from student support to technology - being integrated and well aligned. Creating good ODL requires teamwork, planning and a holistic integrated cycle of continuous improvement. This paper describes how USP (University of the South Pacific) is using the introduction of new technology (Moodle) to reinvigorate university debate and practice on teaching for learning. It ends by suggesting that one of the most critical lessons from past ODL practice is that to achieve good learning and teaching requires good institutional leadership and management.

In many parts of the world stress is being placed on the importance of teaching and learning by governments, governing bodies, institutional leaders and educational commentators. My own university, The University of the South Pacific (USP), in its 2006 to 2010 Strategic Plan, identifies as one of its strategic goals improvements in teaching and learning. Indeed, many governments have funded a number of national initiatives focused on teaching and learning; and the implementation of quality assessments undertaken in the UK, Australia and New Zealand have raised the profile of teaching within institutions. (However, despite this heightened profile it does also remain painfully the case that the research assessment exercises have had much stronger influence on institutions – because, as Moodie (2006) has argued, the research assessments are closely linked to large allocations of money whereas teaching assessment is not.)

Teaching and learning has been given a lot of attention from policy makers because higher education is no longer seen to be providing people with the skills they need to operate in the knowledge economy (see, for example, World Bank, 2003). The knowledge based economy relies primarily on the use of ideas and on the application of technology. Preparing people to deal with these demands requires a model of learning that equips learners with the knowledge, skills, attitudes, aptitudes and values that will enable them to update their knowledge and skills throughout their lifetime. Traditional teaching methods (knowledge transfer from teacher to learner) are considered ill suited to providing the skills needed in the knowledge economy. Educators need to be guides to sources of knowledge and facilitators of learning rather than sources of knowledge. The dominant paradigm of excellence in university teaching is no longer about what

teachers teach but rather what their students learn. It is about evidencing learning. The "new mission" for universities is "to produce learning, not to simply provide instruction" (Tagg, 2006).

The emphasis on learning is not new to distance educationalists. With its roots firmly in adult education and, what now sounds quaintly antiquated, "second chance" education, distance education has always been student centred. Regardless of the model of learning – behaviourist, cognitive or constructivist – good instructional designers and tutors have always focused on students. The first unit in the Commonwealth of Learning's handbook on "Planning and Implementing Open and Distance Learning Systems" is entitled "The Target Group and Their Needs" (COL 2004) and it makes it clear that learning resources are unlikely to be successful if, from the beginning of the production cycle, there is not a clear student profile which influences the development and design of the materials. By analogy, it is unlikely that a commercial product would be successful without extensive market research – but most education is uncompromisingly provider led, with unfounded assumptions about students' desire and "need" for the course.

There are some simple guiding principles behind distance education practice. These principles are not the unique preserve of ODL, but they have defined good practice in learning materials (product) development and in learner support (service delivery). (I have been much influenced by the work of Knowles and other humanistic educators in my professional life. The principles enumerated below are adapted from their work. I make no claim to originality. It is a yet to be written history that many of us who started our professional career with the infant British OU in the 1970s, and were in the regions with the learners, were largely recruited from adult education – and I owe my unsung colleagues much, not least the introduction to humanistic educational praxis.)

1. Learners need to know why they are learning. This implies that the curricula should seek to be relevant to learners and their lives, and build on their experience. Learning is enhanced by examples.
2. Learning should aim to foster learners who are responsible and self-directed persons. This suggests that learners should be supported in developing appropriate skills so that they can take responsibility for their learning. The implication is that techniques that support learners to develop understanding, analytical and critical thinking skills should be used in course design.
3. Learners understand better the knowledge they have discovered than knowledge passively presented by others. The implication is that learning should be active.
4. Successful learning is affective and social as well as cognitive. The implication is that educators should create meaningful social environments for learning. Learners should be treated with respect.
5. Learners learn when they are ready to learn and are motivated. The implication is that learning conditions should be created that are motivational.
6. Learning requires regular feedback. Learners need to know if they are learning correctly.

Whilst none of these items are the unique preserve of ODL, they constituted a defining professional approach to successful ODL and have defined much of the professional induction and development within ODL. See, for example, chapter one in the UK Open University's Open Teaching (1988), where emphasis is placed on teaching and learning,

and the underpinning philosophical and ethical issues regarding the role of educators within the system. The UK OU was of seminal importance in defining excellence in ODL, indeed, perhaps rather inappropriately and imperially, what actually constitutes and defines ODL. But the key point is this - ODL praxis has always placed emphasis on teaching for learning.

> "Teaching that puts learning first looks at first sight less impressive as a performance. It's often slower, with many silences. Students talk to one another rather than answering the teacher's questions. Problems rather than solutions emerge. The teacher consciously and continually imports and refers to personal experience of learning; intellectual processes – analysis, generalisation, comparison of data, theorising – are named when they appear, equal in importance with the topic on which they are exercised. Academic language (hypothesis, evidence, argument, conclusion) is defined and used correctly in examples, so that students can name and use each process when next they need it.
>
> When questions are asked by the teacher, they are genuine questions, not a version of "Guess what I am thinking". They ask what the student is thinking, what premises are being used. Testing how much the student knows is done some other way (work-sheets, reviews of the units), not by an abuse of the Socratic Method. The teacher seldom does anything in the private hope that certain effects will be achieved: the intention is announced before the method is used…..
>
> …….the correspondence teacher explains the score awarded and what to do to get a better one, and engages the assignment in an extended written conversation rather than merely ticking for approval and delivering a verdict" (Open University, 1988).
>
> In this kind of teaching the devices are laid bare; "this is the least manipulative kind of teaching" and emphasis is put on the teacher having skills of "diagnosis, management, listening, categorising, explaining not only points of difficulty, but also the criteria (used) to evaluate the (students) work" (Open University, 1988).

This extract, (written long before terms like mixed mode, distributed or blended learning gained currency), describes what the UK OU wanted from its tutors and how it wanted tutors to behave. The content, the knowledge, were in the course units. Tutorial time – at that time either face to face or telephone, were not to be wasted by the tutor reiterating (inevitably less well) what was already available in the units. Rather their time was to be spent designing and delivering opportunities that enabled and enhanced understanding –i.e. higher level skills and competencies including communication, team and group work.

Providing successful distance education teaches us another key lesson - policy, planning, management and integration of operational systems are critical not only for functioning and sustainable provision, but these systems underpin and enable effective support of student learning. This is an entirely different model than the "professor-centric" "cottage industry" model of conventional face-to-face provision.

ODL has often been described as an industrial process and it is true that it has a complex division of labour derived from the various functions that have to be undertaken – market analysis and identifying the target audience, recruitment, admissions counselling and educational guidance, enrolling students, design and development of courses, distribution of course and course resources, tutoring of students and learner support, student assessment, feedback, examination and graduation, monitoring and evaluation (see Lentell, 2004). It is not that these functions do not go on in traditional provision, but large numbers of students studying off campus requires that these processes are well planned, the delivery systems are robust, procedures disseminated and understood and staff well trained and able to work in teams and partnerships. In other words, the systems have to be open and transparent and orientated towards student learning. Business and project planning are key skills and all processes and functions aligned in order to achieve the desired outcome – student learning. In order that these systems are not only working well but the extent to which they can be improved requires continuous monitoring and evaluation of all the constituent parts and their integration into a well functioning whole. Thus distance education necessitated the development of mechanisms to enable systematic examination – i.e. distance education had to implement audit processes. When I joined the Open University as a part time tutor in 1978 the first thing that amazed me was that I was told what was expected of me, I was required to undertake training and all aspects of my work were monitored, including my comments on my students' assignments. I was a young and inexperienced teacher in those days but not only was this the first time this had happened to me, even though in my full time work I had complete responsibility for many more students, but also in my cohort of Open University new tutors were many experienced professors. They too had to undertake this training and be monitored in the same way. Feedback was made available to me on the performance of my students in relation to others, and students could query all aspects of my teaching and marking. At first I admit this frightened me - was I good enough – but I soon discovered that students rarely abused this system if I was clear about my grading and comments, and because what was required of learners was made clear to them in their course and assignment handbooks – we could all concentrate on learning. Myself included – how could I improve?

1978 was well in advance of the establishment of national quality assurance agencies in the 1990s. And what is more, the UK OU's systems had come from the internal need to understand and thereby enhance its provision – and not an externally driven system to determine standards and increase accountability (see e.g. Thune on the background of the European approach). In the UK the quality assurance system focused on six generic aspects of tertiary education. These were:

Curriculum Design, Content and Organisation
Teaching, Learning and Assessment
Student Progression and Achievement
Student Support and Guidance
Learning Resources
Quality Management and Enhancement

Daniel argues that one could divide up the tertiary education process differently. "However, the key point … is that whatever the list, it is much easier to conduct quality assurance and assessment for distance learning than for face-to-face teaching. This is

because distance learning uses the well-tried industrial principles of division of labour and specialization, operating more systematically and self-consciously than a campus operation" (Daniel, 2006). If process and procedures are not in place in ODL to ensure the integrity of teaching and learning provision, the system will quickly unscramble and the provider will be in constant crisis management. This is a point well made by the case studies in "The Virtual University" (D'Antoni, 2006).

The case I believe is unchallengeable – we have learned from ODL what quality learning is about, we have learnt what needs to be in place in order to deliver quality learning for students. But knowing all these things does not guarantee achievement of quality learning provision!

The University of the South Pacific has identified teaching and learning as one of the five major focus areas in its Strategic Plan 2006-10. It has done this in order to improve student achievement throughout the university and in particular the performance of its distance learners. In 2006 approximately one third of EFTS (equivalent full time students) were undertaken by "distance mode" (USP 2007). And just over 50% of all students (10,769 out of 21,105) were studying at a distance. The university recognizes that the quality of teaching and learning experience it provides is a key factor in the achievement and satisfaction of students. In identifying teaching and learning as a major focus area the university acknowledges it needs to reassess how it teaches in order to prioritize learning, and that it needs to move away from a paradigm of learning that focuses on the transfer of information, to one that guides, supports and facilitates learning.

USP has undergone a major academic restructuring to improve the efficiency and effectiveness of its operation. Prior to the restructure, USP was a traditional dual mode institution. USP has integrated many of its administrative functions and now seeks to mainstream its distance and flexible provision. It has established four faculties and a Centre for Educational Development and Technology (CEDT). CEDT is tasked to work horizontally across the faculties and with a broad remit that recognizes that in order to improve teaching and learning a definition of teaching must include both the activities of the individual lecturer and also "the aims of the curriculum, the methods of transmitting the knowledge those aims embody, assessment of students, and the evaluation of the effectiveness of the instruction with which they are provided" (Ramsden, 1992). That is core ODL instructional design practice. But building on what has been learnt from ODL we know that to implement a pedagogy that prioritizes learning requires intervention at many more levels than the teaching and learning system per se. It requires whole institution integration in achieving this outcome.

A major opportunity for USP to reinvigorate its teaching and learning is the implementation of the new open source learning management system (LMS). The system chosen is Moodle. Up until then, like in many other universities, the developments in online initiatives at USP were not systematic. It would not be fair to sum up these developments as the "random acts of innovation initiated by risk-taking individuals", as Taylor (2006) describes many on-line developments in universities – but the consequences on the university had much the same effect – non-standard and variable provision for students, lack of integration with other university IT systems, huge demands on band width – leading to systems that invariably fell down, lack of scalability and so forth. These developments did not share institutional knowledge of

the field let alone international knowledge and best practice experience – the classic lone ranger phenomenon (Bates, 1999).

USP cannot, because of its mission to serve twelve small island developing states, provide entirely web based learning challenged as we are by access to technology and band width. We are developing hybrid models that will enable colleagues to develop courses with combinations of appropriate technologies. We make no apology for this. Like Laurillard (2002) we maintain that a balance of media is essential to make learning and teaching effective and the ICT element for courses is unlikely to contribute to more than 50% of the total strategy. We will harness the LMS first and foremost to enable interactivity. This is because we want to be able to provide asynchronously the learner discussions and debate that underpinned the learning described in Open Teaching (Open University, 1988) but could then only be achieved by face to face tutorials or through telephone tutorials. We will utilize other technology applications – e.g. the library in a box - but our primary technology will remain CDs and print. We are setting aside discussions that lead on the appropriate blend of media and are planning for the effective support of learning.

Perhaps this will sound contradictory, given that the implementation of Moodle has enabled us to drive the teaching and learning agenda. However, what it allows us to do is to start talking with Faculty colleagues about learning and to ensure that course design, teaching methods, assessment and learning activities are aligned to learning objectives (see Biggs, 2003). But this also requires university policy on "what is a course at USP" – in itself a huge undertaking requiring discussions and agreement about rationalizing the curriculum, defining common standards in student workloads, assessment, marking, feedback, up-dating courses and so forth. An LMS provides the opportunity for the individual lecturer/teacher to work more independently. So we know we have to control quality by implementing a systems development plan and establishing an appropriate role for course development professionals. We also have to make a huge investment in professional development. Since professional development rarely works in the abstract, we are planning to introduce a raft of CEDT fellowships that will allow staff of faculties at USP the opportunity to undertake research and development activities on learning and teaching projects within their school or faculty. We have to define our relationship with faculty staff as partners and need to build partnerships with other critical players – e.g. student administrative services, the library, IT, the bookstore (now responsible for warehousing and dispatch of static learning resources) and the regions.

In this paper I have sought to show that what we know about ODL is that it has led the field in harnessing pedagogy for learning. It has led the way in structuring teaching so that learners acquire the skills for self-directed and independent learning. These skills are now regarded as essential to be successful in the modern knowledge economy. The methodology employed by the UK OU from its early days required that such a pedagogy was a whole institution approach and the policy and operational integration of all systems were mission critical. Moreover, these systems required monitoring and evaluation to check they were working, and to enable them to be fixed if they could be done better. In describing the developments like those at USP I have sought to show how central such "ODL" lessons have been. The implication in all of this is that management and leadership are vital. If I have concerns about achieving the outcomes we at USP have set it is not the inherent difficulties of the Pacific region or the

complexities of the technology I would emphasize. Rather I would emphasize lack of human capacity at all levels but especially with regard to the skills of project management and business planning. In addition we will struggle to align all our university wide systems in a timely way. For example, our human resource management must reward teaching and learning just as research is rewarded. For as Moodie concludes in "No money; no change", considering only pedagogy "…. misses the ultimate reality of achieving educational change: with no money there **is** no change ….Absent rewards for measurable performance, **politics** replace performance" (Moodie, 2006). (My emphasis.) Ultimately changing the orientation of a university is about change management. And this requires vision and leadership.

References

Bates, T. (1999) "*Managing Technological Change: Strategies for Academic Leaders*" San Francisco: Jossey Bass.

Biggs J, 2003 "*Teaching for quality learning in university*" (Buckingham, SRHE/OUP, second edition.)

Daniel, J. (2006) "Higher Education, Teacher Education, Distance Education: What is Quality and Who says so?" Lecture at Workshop on Materials Development for Quality Assurance in Higher Education Bangalore, India February 2006. http://www.col.org/colweb/site/pid/3565

D'Antoni S. (2006) *The Virtual University* UNESCO

Freeman R. *Planning and Implementing Open and Distance Learning Systems* (2004) Commonwealth of Learning

Hunt L., Bromage, A. and Tomkinson, B. (2006) "*The realities of Change in Higher Education* Routledge.

Knowles, M. (1990) *The Adult Learner: A Neglected Species.*

Laurillard, D. (2002) *Rethinking University Teaching. A framework for the effective use of educational technology".* Routledge

Lentell, H. (2004) "Framing Policy for Open and Distance Learning" in Perraton H. and Lentell H. (2004)

Moodie G. *No Money; No Change* in Hunt et al (2006) p.23-26

Open University UK (1988) *Open Teaching.* p. 11-12

Perraton H. and Lentell H. (2004) *Policy for Open and Distance Learning* Routledge

Ramsden, Paul (1992) *Learning to Teach in Higher Education*. Routledge

Tagg, J. "The learning Paradigm College" quoted Parker, L. "National Initiatives to Enhance Learning and Teaching in Higher Education" in Hunt et al (2006)

Taylor, J. (2006) USQONLINE, Australia in D'Antoni S. (2006) *The Virtual University* UNESCO p271

Thune, C. (2007) "The European Approach in Establishing Standards for Quality Assurance" Paper presented at the Conference on "Quality in Higher Education: Principles, Standards & Implementation" Organized by the National Commission for Academic Accreditation & Assessment and Al Yamamah College, Riyadh 4-6 March 2007. Accessed from the web

USP Council 2004 "A regional University of Excellence: Weaving Past and Present for the Future."

USP Strategic Plan 2006 – 10.

USP Council Meeting papers May 2007

World Bank *Lifelong learning in the Global Economy: Challenges for Developing Countries*. (2003) World Bank.

A network-based teaching approach for English courses

Li Guobin and Guo Honguang
China Central Radio and TV University
ligb@crtvu.edu.cn

Abstract

In recent years, there has been a strong emphasis on English course teaching in China. The China Radio and TV University presented a Network-based teaching approach for English courses, taking advantage of combining on-line and off-line teaching modes for distance-learning students. From a CD, students follow guiding steps to learn the course and finish the tasks (homework). Simultaneously, the learning procedure is automatically recorded in a file, which has to be sent to their tutor through an on-line process. The tutors can extract important information from the files, such as the time the student spent on the task, the progress the student made, etc., and help the student in time. This teaching strategy enables the learning procedure of a student to be monitored. Our network-based teaching approach has been proved to be successful.

In the world, which country has the largest numbers of students studying English? It is China. But, in China, it is not easy for a native English speaker to communicate with a Chinese in English, for most people in China who have received a high level of education and got high scores in English would rather read than speak English. For a long time, our English teaching strategy has paid too much emphasis on Grammar, for example, teaching how to avoid falling into "grammar pitfalls" just to encourage students to get high score in the examinations.

In 2003, the China Ministry of Education launched a Project for English Teaching Reform that was to emphasize the priority of teaching English courses mainly for communication purposes rather than stiff grammatical rules. Nowadays, more and more English teaching courses are designed to create active situations for cultivating the students' abilities of listening, speaking, and reading daily English. At this situation, the China National Open University, namely the China Radio and TV University, followed the government's strategy and quickly launched some new teaching pedagogies by new technologies to teach English to distance learning students. A network-based teaching approach was developed in 2003 and has since been improved, which includes a Teaching and Learning Package. A full series of teaching and learning topics are contained on a CD for each student, and a Controlling Procedure to guide and supervise the students' learning procedures is also embedded in the CD to help students' learning and also to generate a record file of the student's study. In the Teaching and Learning Package, the on-line study procedure is the other part of the design. A student normally utilizes the CD materials to study English and finish his homework first in off-line mode; and then separately in on-line mode. The design principle and the practical working procedure of the package are described below:

On the CD, the English teaching courses are organized by Topics or Units, these are "Talking about Yourself", "Family Influences", "Society and Family Life", "Changes in Life", "Ambitions and Dreams", "Learning and Learning Style", "Assessment and Test Yourself", etc. Overall there are 17 Units, providing the students with full opportunities

to practise daily English. In each Unit, several tasks are arranged for students to finish, such as “Vocabulary”, “Reading”, “Grammar and Function”, “Listening and Speaking”, and “Writing” etc.

On the CD, all teaching and learning materials are well designed, and include videos, audios, cartoons, pictures, texts and so on. These materials are used to teach English in a lively way and create real situations for the students to practise English as with “a friendly partner”. In a word, the CD performs the functions of helping the students to clearly grasp the main knowledge of the textbook.

On the CD, a Controlling Procedure was carefully designed to guide students to follow the correct studying procedures, step by step. For example, while a student is studying the Unit “Family and Influences”, normally he will choose to study off-line at the beginning (not to connect the Internet). The Controlling Procedure controls the learning subjects and the tasks that all students are asked to finish to gain partial necessary scores for the course. That is, he has to follow instructions generated by the Controlling Procedure on the CD, and finish all the tasks at his own convenience sooner or later within a set time. For example, the Controlling Procedure informs the student to learn the topic “Vocabulary” before another topic, and then to finish the “Vocabulary” task before the “Reading” task, etc. While a student is doing his tasks, the Controlling Procedure is also generating a recorded file, which will be used for the students’ further on-line tasks.

After a student finishes the task off-line, or if he considers it’s necessary to connect the web for asking his tutor’s help, he can send questions and his recorded file to his tutor through the Internet. The tutor will extract the information from the file, analyze it, understand the progress or difficulties of the student, and then send him back guidance to help him with his further study. More commonly, the tutor will arrange a “Question and Answer” activity on the website for all students who have the same difficulties at the time. And more important, the assessment of the recorded file will encourage the students’ further study, for certain scores will be given to the student who followed the guidance and finished the designed tasks.

In the recorded file, important information includes the time the student spent on his homework, the difficulties the students met and the progress the student made and so on. At present, this kind of information in the recorded file can be kept secret to the students themselves, but is only to be provided to their tutors to judge their learning situations. However, if a student considers that his off-line work is underestimated or his on-line questions are neglected by his tutor, the student has the opportunity to put his remarks on his off-line procedure. The system will recognize the special report generated by the Controlling Procedure for the student’s writing, and the special report will be sent to the supervisors of the relevant department of the University for further treatment.

The Network-Based Teaching Approach for English Course is considered to be helpful for guaranteeing distance learning procedures. The learning situations of the students are apparently to be monitored.

Our Network-Based Teaching Approach for English Courses was introduced to our provincial universities and regional study centres on trial. Statistical analyses from

several thousands students, indicates that about 36% considered the package as “excellent”; 44% “good”; and about 18% considered the package unsatisfactory. The main reason for valuing the approach is for the helpful designs of combining off-line and on-line teaching modes; however, some students still prefer conventional teaching methods face-to-face.

Our network-based English teaching package continues to be improved.

Utilizing technological resources in fostering an integrated system of open learning: the AOU experience

Mohammad Maqusi
Texas Tech University
maqusi44@yahoo.com

Abdullah Al-Salamah and Abdel-Elah Al-Ayyoub
Saudi Arabia Branch, Arab Open University
{abdullahs, ayyoub}@arabou.org.sa

Abstract

This paper surveys the technological elements underpinning the learning process at the Arab Open University (AOU), with particular reference to experiences at the Saudi Arabia Branch (SBA). The study is the result of first-hand experience by the authors as they were all involved in the establishment of the institution as of early days.

Furthermore, student input in this regard was recently solicited via a specially-designed questionnaire aimed at revealing student satisfaction and expectations with regard to a number of elements deemed of main significance to the operation, maintenance and enhancement of the learning process. Findings are subsequently reported herein.

AOU: The beginnings

The creation of the Arab Open University (AOU) came as a personal initiative of HRH Prince Talal Bin Abdelaziz, President of the Arab Gulf Program for United Nations Development Organizations (AGFUND), and Chairman of the Board of Trustees of the AOU.

En route, during the planning stages, formal agreements of collaboration were signed with the United Kingdom Open University (OU). These agreements continue to provide the AOU with opportunities to tap into quality learning resources for certain programs of study, offered by the institution. In addition, they allow the AOU, via consultancy arrangements, to benefit from vastly accumulated experience at the OU.

Later, in June 2001, a formal launching of the institution was made at the Headquarters in Kuwait, followed in 2002/2003 by the launching of six Branches, in Kuwait, Jordan, Lebanon, Saudi Arabia, Bahrain, and Egypt.

A blended system of open education

Over the last two decades, more than ever, there has appeared a confusing plethora of terms, in attempts to describe forms of higher education that do not subscribe to the widely accepted norms of conventional, campus-based higher education. At the AOU, however, we believe that there are traits of uniqueness in the form of Open Education adopted by the institution. This platform combines some traits and attributes of systems of virtual learning, distance education, and distributed education; but it also adds another face-to-face component which, in turn, renders it as a “blended system of open

education". In a feasibility study on the introduction of Online Distance Learning at the University of Plymouth, UK, Furnell and his colleagues (Furnell et al, 2000) point to the important "role of IT" in such a venture, especially to the convenience of students as it eliminates the distance barrier. However, they additionally recognize the limitations of the system versus other requirements, including face-to-face interaction. Therefore, they suggest a framework which has to cater to six major components - content creation, interaction, monitoring, assessment, training, and system operation. This, in a way, coincides, to a good extent, with the concept of Open Education as practiced by the AOU!

As the "convergence of technology" makes more strides, the demands for a parallel "convergence of content" are already increasing. Migrating from Web 1.0 to Web 2.0, for instance, is a manifestation of this. Perhaps a good example in content convergence is provided by comparing Britannica Online, based on Web 1.0 to Wikipedia, based on Web 2.0.

As at other Branches, the Saudi Arabia Branch (SAB) continues to promote the Open Education system adopted by the AOU which, in turn, aims at the creation of a coordinated open learning process. The main components that support this system are outlined below:

Student learning pack
This pack contains the main reading material that has been prepared especially for independent study. Student packs are usually procured from the UK Open University under a special Licensing Agreement.

Tutorial sessions
Tutorial sessions are designed to provide a forum of interaction between the tutors and students on one hand, and the students themselves, on the other. They are run by qualified and trained tutors. In principle, the sessions are supposed to be run as discussion forums treading on the main topics of the course in accordance with set course calendars.

Tutor-student contact
Creating channels of contact and communication between the Tutors and students, outside class sessions, is viewed as important for the enhancement of the learning experience. In turn, Tutors are required to maintain announced weekly office hours. They are intended to provide a more informal environment of tutoring. Some Tutors may choose to enhance face-to-face contact by utilizing chat facilities or email service as alternative means of providing contact and communication with their students. The Branch encourages this practice.

Computer and multimedia laboratories
Acquiring proper computer and Internet skills is a main requirement of all AOU students. As a technology-driven institution, the Branch consequently equips all of its Learning Centers with computer and multimedia lab facilities. The facilities are then made available to students over long daily hours of operation.

Value-added online learning resources

Video streaming of tutorial presentations
Few years back, the Branch ventured into pioneering the idea of utilizing video streaming for "net-broadcasting", for some courses, as a trial, transitional experience which is hoped to ultimately involve all courses. This is seen as a useful online tool for supporting the learning process, especially to the benefit of the remote Regional Centers in the Kingdom of Saudi Arabia. Plans are set for developing this venture into a platform of "Lecture on Demand".

Learning management system
The Branch adopts a particular learning management system (LMS) based on the Moodle platform. It is designed for use by the Tutors and the students in order to facilitate various aspects of managing the learning and assessment processes. In turn, it is intended for the support of the presentation of online components as part of the course study.

Furthermore, the SAB is currently engaged in the integration of the learning management system with the existing student information system (SIS) and the "TURNITIN" plagiarism software application detection system. This particular venture illustrates the need for integration when applying different IT components.

Internet-based video conferencing
Internet-based video conferencing continues to be a top priority in the KSA branch. The geographical and cultural aspects make this type of computer-mediated communication a great necessity. This year, for instance, the Regional Centers have been connected by two-way videoconferencing. In yet another venture, closed circuit TV is used to interconnect the teaching rooms between male and female sections at the Branch.

It is interesting to note that in a 2005 study commissioned by UNESCO, Jung (Jung, 2005) comments on the "good practices" of Open and Distance Learning (ODL) in Asia and the Pacific. Concerning ICT innovations, the study recognizes that investment in IT infrastructures provides new opportunities for distance education in the application of multimedia, LMS and e-books, for instance. But it also challenges the ODL institutions to find new ways of using these technologies with more innovation, to the advantage of the learning process itself. A similar study (Chickering and Gamson, 1987), outlined seven principles for "good practice**"** in undergraduate education. This was later followed by a proposal (Chickering and Ehrman, 1996) for implementing them using technology as a main lever. It is interesting indeed to note that their suggestions coincide largely with policies adopted by the AOU in using various technological platforms for the enhancement of the learning process. In particular, via the application of technological resources and face-to-face interaction, the AOU encourages both student-faculty and student-student contact. Active learning is further promoted via tutorial sessions and online course websites.

Promoting a "Mega Education Initiative"

As an open education system, the AOU/SAB intends to expand links of collaboration aimed at enhancing the learning and educational experiences of students and academic staff. In this respect, the Branch shall seek to establish a number of partnerships with

other academic institutions abroad in order to diversify avenues of experiential exchanges.

The following activities are estimated to be of immediate interest to the Branch:

1. *Delivery of topical lectures* by academic staff from other universities in disciplines of concern to the offered programs of study, especially to the benefit of more remote Branch locations.
2. *Training workshops*: Arrangement and delivery of training workshops is another activity that is aimed at enhancing the competencies of local staff. This may be carried out efficiently via videoconferencing facilities.
3. *Seminars*: It is also possible to think of the arrangement of a series of seminars on current topics of interest to a certain discipline or to the academic community at large.
4. *Guest keynote lectures*: The SAB wants to initiate this activity by inviting well-known speakers to deliver keynote lectures which would be open to the local communities from within and outside the institution.
5. *Formal links with other institutions*: It is important to establish formal links of collaboration with other institutions, especially the ones abroad. These links are aimed at facilitating the exchange of students, faculty, and experiences in general. They also help to underpin many of the other activities outlined herein.
6. *Outreach initiative*: The AOU, and perhaps more so, the SAB, will have to rethink institutional mission and vision directions. In particular, we envision the institution serving as a catalyst for socio-cultural change. In this respect, technology is the vehicle for bringing about desired changes; but the institution is the driver.

All of this is viewed as part of promoting the paradigm of "lifelong learning" which is emerging as a defining dimension of the missions of many higher educational institutions. Indeed, as more universities, both traditional and nontraditional, are realizing the need to cater for various modes of learning, including distance education, and the needs of lifelong learning, technology is again viewed as an integral part of the solution (Horgan, 1998).

Meeting student expectations

At the end of the day, an academic institution is all about students. The SAB of the AOU is no different. Adopting an open education system may still place more demands on a variety of student services, different from those required at traditional institutions. In this regard, it pays to listen to students.

Students have their say

A questionnaire was designed in order to reveal the level of satisfaction with regard to certain specific IT-based services, ranging from the Branch website, to course websites, and to e-Learning resources. In addition, students were asked to list major areas that they estimate would enhance currently available services, and to list as well others that need to be introduced as new IT-based services. For said survey, the selected student population covered all disciplines, cutting across all levels of study.

The student survey revealed areas of highest satisfaction residing in the offering of the system of open education and the e-Learning platform; least satisfaction was

predominantly the Branch website and the absence of e-Library resources. In other respects, course websites were viewed generally as acceptable, while the quality of institutional email services were viewed with some reservations.

It is obvious that students appreciate the education opportunities offered to them via open education, but do aspire for more expanded services in other areas. As a result of said survey, it seems that the SAB needs to enhance IT-based resources for the support of non-learning activities, and to hasten the process of renovating its website, and to make it more interactive.

With regard to student expectations of IT-related services, the survey reveals that students would like to see more student online forums and enhanced chat facilities for students and tutors, and major renovation of the Branch website. It also reveals that students like to see the introduction of other new services such as online tutoring support, online registration and grade acquisition, and the issuance of AOU-based email accounts. The SAB intends to look into these issues earnestly.

Going Forward

- There is an obvious need to enhance the e-Learning platform in order to support more ways of contact between Tutors and students on one hand, and student groups on the other.
- Capabilities of the computer labs also need to be enhanced via the particular addition of certain applications software packages.
- Priority will be given to pursuing the integration of the e-Learning and the SIS systems in particular, and integration of the SIS with other systems, in general.
- ODL institutions generally suffer from comparatively higher rates of student attrition. Consequently, we may ask, "Can technology be invoked as a constructive resource for increasing student retention?" We think so. As more electronic contact is promoted and more online help is supplied, it can surely help.

Bridging the Divides

Based on an intertwined duo of technology and information, the "Digital Divide", as estimated by many studies, stands erect between the industrially-developed countries and their developing counterparts, a Divide, standing more erect, between the North and the South.

As an Open Education institution, the AOU has been reiterating its commitment to making sure of leaping through the Digital Divide. In consequence, the SAB, in particular, has embarked on a number of IT-base activities, some of which are mentioned herein, and are intended for facilitating and enhancing the tutoring and learning processes.

In particular, the Branch desires to make use of modern IT resources to the benefit of certain disadvantaged sectors of the Saudi society. This would, for instance, include the sector of women, especially those residing in remote areas. Providing them with flexible opportunities is a solid contribution to their empowerment.

In another respect, the AOU has adopted a much-needed mission of bridging another divide of the higher education culture by transforming many of its academic staff from a

culture of conventional universities to a culture of open education; thereby, effecting a transformation from a "culture of teaching" to a "culture of learning." The task has been an arduous mission, and continues today. Various types of training workshops have been held for this purpose; some are generic, and some are course-specific. The established partnership with the AOU, it must be admitted, has been a valuable resource in this regard. Interestingly, this reminds us of Schumpeter's paradigm of "Creative Destruction", originally devised, in 1942, for application to business and economic systems. In essence, you restructure the system by slowly and continually replacing old elements with new elements, obviously intended to renew and reinvigorate the system. The same applies to situations where IT infrastructure revamping is called for.

In the article (Koch, 1998), James V. Koch, President of Old Dominion, acknowledged that the revolution in Higher Education is coming, sailing on a Schumpeterain ship of "Creative Destruction". When the gales of change come along, they are often technological in nature. Koch observes that the' teaching model" is giving way in parts of it, at least, to the emerging "learning model." In our opinion, technology is viewed as the main driver for the latter model. Perhaps, many institutions could benefit from the invoking of the principle of "Creative Destruction."

References

Chickering, A.W. and Ehrman, S.C. (1996) "Implementing the Seven Principles: Technology as Lever"; AAHR Bulleting.

Chickering, A.W. and Gamson, Z.F. (1987) "Seven Principles for Good Practice in Undergraduate Education", AAHE Bulletin.

Furnell, S., Evans, M. Phippen, A., and Ali Abu-Rgheffi, M. (2000). "On-line Distance Learning: Expectations, Requirements and Barriers"; at http://www2.plymouth.ac.uk/distancelearning/odl-1.html

Horgan, B. (1998) "Transforming Higher Education Using Information technology"; The Technology Source.

Jung, I. (2005) "Innovative and Good Practices of Open and Distance Learning in Asia and the Pacific"; UNESCO.

Koch, J.V. (1998) "The Revolution in Higher Education"; at http://law.richmond.edu/rjolpi/Issues_Archived/1998_Fall_Education_Issue/koch_fin.htm

Potential benefits and complexities of blended learning in higher education

Regina K. Masalela
University of Botswana
masalelar@mopipi.ub.bw

Abstract

Blended/hybrid learning is dominating news in higher education as a training and educational delivery method of choice. It is seen as a link between instructors, learners and classrooms located in different places to enhance learning. Based on the interviews with 15 faculty members and one administrator that had direct experience with this form of delivery at the University of Botswana (UB) the findings suggested two major themes that dominated faculty members' accounts: potential benefits and challenges of blended learning. The study was guided by the Diffusion of Innovation theory. The potential benefits of blended learning included improved pedagogy; engagement in learning; and added flexibility in the teaching and learning to mention a few. Faculty members perceived complexities such as lack of students' readiness to use the course management system, slow network and breakdowns; lack of computers for students and lack of time. The article concludes by suggesting future directions for blended learning at the University of Botswana.

Introduction

Blended learning (BL) and the use of computer-mediated communication (CMC) tools are fast growing in popularity in higher education contexts. This concept has become somewhat a buzzword and a bit ambiguous in higher education. However, the adoption of this medium in the teaching-learning process has quickly outpaced our knowledge on how it might be best utilized for optimum learning.

Blended learning has been defined in a number of ways. According to Graham, Allen and Ure (2003), the three most common definitions are those by Bersin & Associates (2003) and Thompson (2002) who see blended learning as learning that combines instructional modalities. Driscoll (2002) defines blended learning as combination of instructional methods. Other scholars view blended learning as a combination of online and face-to-face instruction (Reay, 2001; Rooney (2003; Young, 2002).

The first two definitions reflect the debate on the influence of media versus method of learning. Both positions look at blended learning in a much broader way that encompasses all learning systems. The two definitions do not capture the essence of what blended learning is and why the scope of blended learning is so intriguing to many people. The third definition accurately reflects the historical emergence of blended learning systems. The author prefers the third definition because it reflects the introduction and practice of BL at the University of Botswana (UB). It emphasizes the central role of computer-based technologies in blended learning (Graham, 2004). It is essential that we understand how to create effective blended learning experiences that incorporate both face-to-face and computer-mediated (CM) elements. For the

institution to be engaged in blended learning there must be a concerted effort to enable the learners and the faculty members to take advantage of both worlds.

Faculty members play a significant role in the diffusion of any new innovation in learning. Therefore, there is much to learn by delving into the perspectives and experiences of faculty members and administrators who are involved in this mode of delivery. Understanding blended learning experience from the faculty members and administrators' perspectives provide important insights on how blended learning environments could be better designed and facilitated. Consequently, the purpose of this inquiry was to identify faculty members' perceptions on using a blended learning approach.

Context

The study was conducted at the University of Botswana (UB) the sole national university with a student population of over 12,000. Like other tertiary institutions worldwide, UB is going through transformation to take advantage of the rapid emergence of technological innovations that have had a huge impact on the possibilities for learning in the distributed environment. There is "pressure to deliver well-trained and skilled workers to meet the increasingly sophisticated demands of the workplace" (Mutula, 2002:99). eLearning (a subset of blended learning) as one of the ICTs in particular brings new levels of connectivity to the teaching-learning process. Students are connected to other students, students and to global resources through the World Wide Web (WWW). Therefore, UB explores the connectivity in blended teaching learning processes.

UB is currently using a Learning Management System where courses are offered via the Web Course Tool (WebCT). The university also has an eLearning Support Center using wireless computing. The Educational Technology Unit (Edu-Tech) carries out the training of academics in the effective and appropriate use of educational technologies. Every staff member has a Pentium computer, printer or access to a printer, access to the Internet and e-mail.

The rationale for using blended learning at UB

The rationale for using advanced learning technologies such as eLearning includes increasing the quality of learning; creating students success rate; supporting new research opportunities; relieving academic staff from administrative and teaching duties; supporting academic freedom and freedom of speech through free information flows and making teaching more rewarding and exciting (Molelu & Uys, 2003). E-learning, if well designed, could provide flexibility in learning whereby students study at their own pace, place and time. The purpose of this study was to qualitatively examine factors that influence faculty members' decision to use blended learning at the UB.

Methodology

Participants

There were fifteen participants in this study, grouped into two categories: adopters and non-adopters. Adopters were faculty members who taught one or more blended courses. Non-adopters did not teach any blended course. There were seven adopters, seven non-

adopters and one administrator of the Edu-Tech. Among the adopters, seven were male and one female. With regard to their qualifications, five had doctorate degrees while three had masters' degrees. Among the adopters, three were senior lecturers, three were lecturers and one was a professor. One participant was an administrator in Edu-Tech. Of the seven non-adopters, four were male and three were female.

A demographic survey was sent via email to the participants to invite them to participate in the study. Completion of the demographic survey was taken as an indication of the interest and consent to participate. The demographic survey solicited participants' gender, qualifications, years of teaching experience at UB; number of BL courses taught and Faculty/Department (see Table 1 and 2 below).

For adopters and non-adopters of BL, see Table1 and Table 2 below.

Table 1

Blended Learning Adopters Profile Matrix

Participant	Owen	Baker	Motsamai	Oluchi	Maseko	Ndubuisi	Edeoga	Rand
Gender	Male	Male	Male	Male	Male	Female	Male	Male
Qualifications	Ph.D	Masters	Masters	Ph.D	Ph.D	Ph.D	Ph.D	Masters
Technological Competency*	I	I	I	I	I	I	I	E
Years of Teaching Experience at the University of Botswana	30	4	14	1	21	7	10	2
Number of Courses Taught Online	6	3	0	1	2	1	2	1
Faculty/Department	Education	CAD	CAD	Social Sciences	CAD	Education	Education	Science

*N= Novice, I=Intermediate, E=Expert

Table 2

Blended Learning Adopters Profile Matrix

Participant	Sedie	Seloka	Motshabi	Mogomotsi	Motseothata	Teedzani	Malomo
Gender	F	M	F	F	M	M	M
Qualifications	Ed.D	Ed.D	Masters	Ph.D	Ph.D	Masters	Ph.D
Years Teaching Experience at UB	13	13	20	8	21	6	19
Technological Competency*	I	I	I	I	I	I	I
Faculty/Department	Education	Education	Education	Social Sciences	Education	Social Sciences	Education

N=novice, I=intermediate, E=expert

Procedure

The study was qualitative in nature-guided by Rogers (2003) theory of Diffusion of Innovation. An important factor regarding the adoption rate of innovation is its compatibility with the values, belief systems and past experiences of individuals in the social system (Rogers, 2003). The perceived attributes of innovation help to explain how the characteristics of an innovation shape faculty members' decisions to adopt BL and the rate at which it is adopted. Relative advantage "is the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p. 15). Compatibility "is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters" (p. 15). Complexity "is the degree to which an innovation is perceived as difficult to understand and use" (p. 16). Trialability "is the degree to which an innovation may be experimented with on a limited basis" (p. 16). Observability "is the degree to which the results of an innovation are visible to others" (p. 16). Based on these characteristics, chances of adoption are increased when the innovation is perceived to be better than the idea or practice that preceded it; when it is consistent with the adopter's needs, experiences, and values; when it is easy to understand or use; and when it can be tried or experienced on a limited basis; and the results can be seen.

Each participant engaged in semi-structured questions, the purpose of which was to discover motivating and deterrent factors from teaching blended courses. The individual interview lasted from 40 minutes to 1 hour. The interviews were audio-taped with the participant's permission and then transcribed verbatim. Follow up through email was made to clarify issues emanating from interview data for better representation of their responses.

Data Analysis

The constant comparison method was used for the semi-open ended questions (Lincoln & Guba, 1985; Bogdan & Biklen, 1998). Initially the researcher used open coding of responses to determine trends in the data. The researcher drew upon tacit knowledge in making this initial judgment for early category formulation. Colored markers were used to differentiate participants' themes so that the data would remain in context and provide visual indication of emerging themes. Direct quotations were used throughout the report to preserve the voice of the participants. Pseudonyms were assigned to maintain the participants' anonymity. The findings were then interpreted based on the perceived attributes of innovations (relative advantage, complexity, compatibility, trialability and observability).

Findings

The two major themes that dominated faculty members' accounts were benefits and challenges of teaching blended courses.

The adopters noted the potential benefits of blended courses among others as (1) improved pedagogy; (2) engagement in learning; and (3) added flexibility. Both the adopters and non-adopters indicated some challenges to teaching blended courses. The challenges included four major themes: (a) Formal faculty development program for teaching blended courses; (b) Allocation of the necessary time for faculty members to redesign traditional courses into blended courses; (c) Preparing students to learn effectively in blended courses; (d) Infrastructure.

Potential Benefits

All the adopters and some non-adopters were positive about blended learning. They believed that blended courses had potential benefits for both students and the instructor. In blended courses, students are motivated to explore related topics on their own and develop critical thinking skills. Students readily access information from online technology and enhance their learning. Learners become self-directed and, in the process, develop lifelong learning skills. Some benefits for faculty members from teaching blended courses included (but not limited to) fulfilling a personal desire to teach; opportunities for scholarship; providing innovative instruction and intellectual challenge. Following are some of the adopters' comments:

> Dr Owen pointed out that blended learning had
> Direct pedagogical advantages, the role it can play in developing generic lifelong learning skills which are essential; the potential it has for us to expand access off-campus-and even…large education classes are very efficiently using online learning on campus to reach better the large student groups…I see it as a key future direction for our institution.

> Dr Oluchi concurred that it
> …seemed a logical extension; …my pedagogical approach was learner-centered, involved discussion, group work and projects, etc. The Internet and the online components …extend and build on that kind of approach. I was always seeking how to improve teaching and this fitted in with the approaches I liked and the direction I was already taking.

Engagement in learning

The adopters reported that students develop critical thinking skills and become independent thinkers through blended courses. Dr. Maseko (Media Studies lecturer) believed that students developed skills to use even when they leave the university. He noted:

> When you design a course - after putting links, people can go beyond the classroom instruction…lifelong learners - you get lifelong learning skills even if you leave here.

There is also improved interaction between the learners and the instructor and among themselves. Students form a community of learners through discussion fora. One of the adopters, Dr Edeoga asserted that "…learning is more interactive and…they [students] take a more active role in their learning process."

Flexibility

The online segment of a course tends to be asynchronous, thus allowing students to work on their own schedule in different locations. Students also enjoy the best of both worlds - direct contact with their teacher and the convenience of online technology. Following are some of the adopters' comments:

> The advantage of using WebCT is that the material is always available for the students. They can access it any time.

> I have been able to do a lot more than I was able to do outside the online. Traditionally there has been a limit to how much I could give the students or make available to the students to interact but now I think with online there is far greater volume of work that can be done.

Complexities of blended learning

There was a slight contrast between adopters and non-adopters perceptions regarding the challenges in teaching blended courses. Non-adopters noted extrinsic motives as motivators for teaching blended courses while adopters stated intrinsic motivators. However, all the participants identified four major challenges in teaching blended courses:

- Formal faculty development program for teaching blending courses
- Allocation of the necessary time for faculty members to redesign traditional courses into blended courses
- Preparing students to learn effectively in blended courses
- Infrastructure

Formal faculty development for teaching blended courses
The design of hybrid/blended learning value rests with sound and appropriate instructional design. The medium of classroom lecture notes or other instructional materials cannot be directly transferred to the web. The web as a different delivery medium requires different strategies for effective communication. Training of faculty members plays a significant role in supporting the transition from instructor-centered learning to a student-centered model. The faculty members in this study identified training as one of the key factors that could influence them to participate in blended learning. The participants considered ongoing training, a reliable network, and students' access to computers as essential elements.

Allocation of the necessary time for faculty members to redesign traditional courses into blended courses
Designing, developing and teaching a blended course takes a significant amount of time. The process includes among others: amount of student-to-faculty contact; student engagement in activities hence seeking more assistance; managing a large class and getting students online to view instructional materials; properly downloading and configuring software and comfortably working from a web based learning platform (e.g. WebCT); and using available course management tools that lead to more work. Dr Oluchi (Sociology lecturer-adopter) sums faculty members' perception on added workload:

> You have to do a lot of thinking and planning. But when you have done all these, assembled all your resources and the links, and you start the course, the work is lighter.

Preparing students to learn effectively in blended courses
Students' readiness to participate in blended courses could add to the success of online learning and could be influential to faculty participation. The time demands of blended learning could be exacerbated by the relatively poor technological skills of the students.

Some faculty members believed that computer literacy of students was a challenge. A good number of students were not ready for online learning when it was implemented at UB. Dr Ndubuisi noted, "Some of my students actually dropped out of class last semester and even this semester because they couldn't cope." The issue of training for students came up repeatedly during the interviews. Mr Teedzani (Sociology lecturer/non-adopter) commented: it has to be demonstrated to the learners - to the people that…benefit more from using it."

Infrastructure

Teaching in a technology-mediated environment posed a number of challenges for the adopters. One of the most frequently mentioned points related to the technology infrastructure (physical and human). Faculty members are clearly influenced by the capability and reliability of the systems in place for online learning delivery, and faculty members credit the leadership of the university with the quality or lack of quality of the technological infrastructure. They would prefer to have a technician handy to help them whenever they encounter a problem. Mr Rand (Computer Science Lecturer-adopter) expressed his frustration with network, "there is a problem with the network or the computers not functioning properly". Instructors wanted to be able to count on the system working even though they knew that every system has its potential breakdowns. Dr Maseko (Media Studies lecture-adopter) lamented, "whenever you get a chance so that the students can practice - sometimes the computers are not working". Dr Edeoga (Special Education lecturer-adopter) shared the same sentiment "giving them [students] links and asking them to look up…sometimes you find that the system is very slow and the student suffer…at peak time…you find that you have difficulties downloading certain things. It could take hours."

There were inadequate computers for students and access to existing computer labs was minimal. Dr Edeoga (Special Education lecturer-adopter) noted:

> The computers are really inadequate for students…because they don't have personal computers, they either go to the library or to the Special Education lab to use computers and at times its full and they have to wait for their turns. They can go to the library but many of them claim that before they come to lectures the library is already full so they are not able to use it as much as they would want to.

> Dr Owen (Adult Education lecturer-adopter) shared the same disappointment: We know that our system is very slow. This can be quite a problem when you are trying to exemplify something or provide information very quickly; there are delays because the system is slow. It takes a while for things to come on.

> Mr Malomo (Mathematics lecturer/non-adopter) who was involved in the initial inception of blended learning stopped participating out of frustration. He decried:
> I pulled off because I didn't believe … (in the direction we were taking); when we started this elearning process, the whole idea was that the university was going to provide…computers for students…That was the goal…but…I found that it was a waste of time because there were no computers—nobody seems to care about what is going on.

Discussion

We used Rogers' Diffusion of Innovation theory to interpret the findings. The findings are discussed within the five perceived attributes of Innovation: (relative advantage, compatibility, complexity, trialability and observability). It should be noted that due to the interaction of these attributes, many points of discussion span more than one element.

Relative Advantage

Relative advantage "is the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003:15). Both adopters and non-adopters 'perceptions of the relative advantage of blended learning as an innovation were well within a positive range and generally verify the attributes of relative advantage identified by Rogers (2003). The evidence from the semi-structured questions with regard to this attribute reflected less of an interest in economic benefit as an indicator than Rogers suggests. Even though there was high potential for blended learning innovation to satisfy faculty need, in that the adopters recognized that the innovation (made learning more accessible and flexible to the students; enhanced learning and faculty developed professionally), some limitations were noted by some non-adopters. Limited time and other teaching priorities collided with the perceived opportunities of this innovation. However, the findings essentially correlate with Rogers' generalization that perceived relative advantage is the degree an innovation represents an improvement over past ideas.

Compatibility

Compatibility "is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters" (p. 15). Adopters believed that the online aspect of blended courses was complementary to their face-to-face instruction. The findings are consistent with Rogers' (2003) general view that compatibility is perceived as positive related to the rate of adoption. On the contrary, some faculty members believed that online learning was not compatible with their teaching because it added more workload. Non-adopters pointed out that they had other responsibilities, thus did not have time for training and preparing for teaching blended courses. Additionally, they expressed concern for insufficient resources that could facilitate blended learning. Furthermore, they argued that the innovation required too much of a shift of priorities, in use of time and energy, from other needs, pressures, and perceived responsibilities related to teaching.

In Rogers' paradigm listing variables determining the adoption rate, reference is made to strategies operative within the organizational system related to types of innovation decisions, communication channels and the nature of the social system itself. Analysis of the data showed that organizational conditions (imperatives) that were present prior to the innovation's trial, or those that developed concomitant with innovation, appeared to have had an impact on this new idea, and they have apparently affected the participatory energies and commitment of some users.

Complexity

Complexity "is the degree to which an innovation is perceived as difficult to understand and use" (p. 16). The data indicated that the innovation was easy to use. For non-adopters, online learning was a rather complex undertaking since they did not have

training. This suggested that the less complex an innovation is perceived to be, the more likely it is to be adopted. Comparison and analysis of the data in this category with findings of the compatibility category suggest a strong relationship between the difficulty, (perceived by non-adopters) in using the innovation (complexity), and compatibility with the users' ability to innovate and utilize the innovation. For non-adopters, the innovation appeared too demanding of their time and energies.

Trialability

Trialability "is the degree to which an innovation may be experimented with on a limited basis" (p. 16). The findings of this inquiry clearly support the presence of trialability as a characteristic of an innovation as identified by Rogers. Examination of the data suggested that blended learning has unrealized potential at UB, specifically because the trial or use of the WebCT learning management tool has not been utilized to its maximum. The environment in which the innovation has been developed has not adequately facilitated faculty members' experimentation. Dr. Ndubuisi (adopter) lamented that some features of WebCT like "chat" were not activated. He added that multimedia features were not active. Consequently he could not use video for "dance" in an English literature class. In general there was an inadequate and poor condition for trial. Concurrent programs generally took precedence over blended learning. Time to use and understand the innovation was seriously limited. There was a relatively high interdependence between trialability and complexity. There was also a relationship between reduced complexity and increased trialability.

Observability

Observability "is the degree to which the results of an innovation are visible to others" (p.16). Faculty members' responses to observability were generally weak. This is in contrast with prior studies such as Hahn (1974) that used Rogers' theory. The majority of faculty members did not believe that the innovation must be seen in order to be understood. These findings do not corroborate Rogers' hypothesis of observability, which states, "the observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (Rogers, 2003; p. 258). The majority of the adopters of online learning did not view observability as an important issue.

Limitations

The present study is not generalizable because the sample was small, hence not representative of other settings. Furthermore, the researcher exercised no experimental control over the participants in the study. Therefore, cause and effect relationships were not confirmed.

Future directions from blended learning at UB/Implications for practice

Generally the participants had positive attitudes toward blended learning. Non-adopters were positively inclined to adopt blended learning but they had some issues. This suggested that if the UB could address these issues, non-adopter might adopt blended learning. These results supported Rogers' idea that any new innovation will be adopted and diffused at different rates throughout an organization. The underlying assumption of this study was that administrators at UB can increase participation and acceptance of blended learning by including the potential faculty members' adopters in the decision-

making process. Faculty members, on the other hand, need to be fully aware of the capabilities of the technology and how it can be used to facilitate teaching and learning. As educational models for delivering instruction change and learners' needs continue to evolve, there is need for continuous training and support. As the UB expands its online programs, it will need to show commitment to address the issues of resources to assure faculty continual participation in blended learning.

Conclusion

The need to reform existing educational programs and implement new ones requires the understanding of faculty members and administrators' beliefs concerning blended learning. Faculty may be reluctant to attempt new avenues, especially when they must continue their ongoing responsibilities and are not receiving additional compensation for their new responsibilities. There is need for faculty training and university faculty development centers. A designated university-wide faculty development center with a learner-centered philosophy is essential to the success of any technology-based distance education program (Bakutes, 1998). Additionally, issues such as merit, faculty workload and the changing role of the faculty member need to be revisited and revised as needed based on the new high education needs. Faculty promotion and online learning policy need to adapt promotion criteria based on the learning paradigm.

References

Bakutes, A. P. (1998). An examination of faculty development centers. *Contemporary Education,* 69 (3), 168-171.

Bersin & Associates. (2003). Blended learning: what works?: An industry study of the strategy, implementation, and impact of blended learning: Bersin & Associates.

Bogdan, R. C., & Biklen, S. K. (2003). Qualitative research for education: An introduction to theories and methods (4th Edition). (Boston: Pearson Education Group, Inc.)

Driscroll, M. (2002). Blended learning: Lets get beyond the hype. *E-learning,* 54.

Garnham, C., & Kaleta, R. (2002). Introduction to hybrid courses. *Teaching with technology today,* 8 (6).

Graham, C. R., Allen, S., & Ure, D. (2003). Benefits and challenges of blended learning environments, in: M. Khosrow-Pour (Ed.), *Encyclopedia of Information Science and Technology I-V. (*Hershey, PA: Idea Group Inc.)

Graham, C. R. (2004). Blended learning systems: Definition, current trends, and future directions in Bonk, C.J. & Graham, C. R. (Eds.). *Handbook of blended learning: Global Perspectives, local designs.* (San Francisco, Pfieffer Publishing).

Hahn, C. L. (1974). Relationships between potential adopters' perceptions of new social studies materials and their adoptions of those materials in Indiana and Ohio. *Dissertation Abstracts International,* 35, 5679-5680A. (University Microfilms No. 75-5558).

Lincoln, Y. S., & Guba, E. G. (1985). Natural inquiry. Newbury Park, CA: Sage.

Molelu, G. B., & Uys, P. M. (2003). Development of eLearning at the University of Botswana: Challenges, achievements, and pointers to the future. ELearning Conference, MORUO Communications. Fourways, Johannesburg. South Africa, 27 August.

Mutula, S. M. (2002). E-learning initiative at the University of Botswana: challenges and opportunities. *Campus-Wide Information Systems*, 19(2), 99-109.
Reay, J. (2001). Blended learning – a fusion of the future. *Knowledge Management Review,* 4 (3), 6.
Rogers, E. (2003). Diffusion of innovations (Fifth Edition). New York: The Free Press.
Rooney, J. E. (2003). Blended learning opportunities to enhance educational programming and meetings. *Association Management,* 55(5), 26-32.
Rossett, A. (2002*). The ASTD E-Learning Handbook*: M*cGraw-Hill.*
Thompson, I. (2002). Thompson job impact study: The next generation of corporate learning. Thompson, Inc. Retrieved July 7, 2003 from http://www.netg.com/DemosAndDownloads/Downloads/JobImpact.pdf
Young, J. R. (2002). Hybrid teaching seeks to end the divide between traditional and online instruction. *Chronicle of Higher Education,* pp. A33.

E-education and Edusat: enhancing learning and teaching

Meenakshi Mathur
Jai Naryan Vyas University, Jodhpur, India
mmathur26@yahoo.co.in

Abstract

Today the sources of learning are video programmes, text and graphic based E-resources. There is going to be a time, and it may not be too far away, when the shift to the electronic mode of producing, retrieving and preserving knowledge will become common practice. This will, however, require re-orientation of our teachers. They need to use multiple resources in teaching and learning, i.e., text, face-to-face, video resources as well as E-content resources. An attempt was made to prepare a syllabus-based programme on Human Development consisting of 15 video films concerning reproductive health education and pre-natal growth and development. Each one is of half an hour's duration. A research study of the first lecture (first video film) entitled "Human Genital Organs" was done with B.Sc. Home Science IInd Year students using a structured questionnaire of 20 questions with true and false as answers, based on the content of first film. This was given to the students as a pre-film test and post-film test. In between the two tests, a film show was arranged for the students. The results indicated that the increase in knowledge of the whole group was 21.45%, for students in the English medium the gain in knowledge was 18.9% whereas for Hindi medium students it was 25.75% respectively.

E- Education and Edusat

Communication technologies are advancing very swiftly from single channel transmission in 1962 to unlimited channels in 2007. This is also true in Education, beginning with the use of Satellite Instructional Television Experiments (SITE) in 1974-75, it has advanced to enable 24 hours Worldwide Internet Communication. Today the sources of learning are video programmes, text and graphic based E-resources. As Prof. Kalpana Mathur, Director, Educational Multimedia Research Centre (EMMRC) of J.N.V. University, mentioned in her article, there is going to be a time, and it may not be too far away, when the shift to the electronic mode of producing, retrieving and preserving knowledge will become common practice. This will, however, require re-orientation of our teachers. They need to use multiple resources in teaching and learning, i.e. text, face-to-face, video resources as well as E-content Resources. Once knowledge is preserved in E-content form or video form, it can be made available at low cost in the classroom as well as to students at a time and place convenient to them. When internet and interactive satellites are the order of the day, a re-look at the process of developing educational content becomes imperative. The availability of more bandwidth on interactive satellite, internet and Fiber optic Networks has encouraged the educational service providers to think of newer forms of interactive educational content.

India has successfully launched EDUSAT on 20th September, 2004 with the precision of the world standard. The University Grants Commission (UGC) is going to set up a network of institutions connected with EDUSAT by linking Educational Multimedia Research Centres, Academic Staff Colleges and Universities and Colleges of potential

excellence. This network is going to cover almost all parts of the country and will offer 2–way communication. Signals from these locations would be carried out through the sub-hub at the Consortium for Educational Communication (CEC) to EDUSAT and then spread throughout the country. So teaching locations can also be at as many places as where Satellite Instructional Televisions (SITs) are installed. This would offer an enormous opportunity for exchange of quality knowledge and bridge the knowledge gap between the various locations. It will help in reaching out to a large population, opening new possibilities and unlimited opportunities.

Knowledge Gain about Human Development among College Sudents

An attempt was made to prepare a syllabus-based programme on Human Development consisting of 15 video films. Each one is of half an hour's duration and is concerned with reproductive health education and pre-natal growth and development. A research study of the first lecture (first video film) entitled "Human Genital Organs" was done with B.Sc. Home Science IInd Year students.

A series of 15 films on Human Development was started at the Educational Multimedia Research Centre (EMMRC), Jodhpur in year 2004 and has now been completed. This is a syllabus-oriented film series, which is basically scheduled for B.Sc. Home Science Second year students. Human Development is the study of human beings from conception to old age. The first film was made on the human reproductive system and was shown to B.Sc. second year students.

Methodology

- Firstly a structured questionnaire of 20 questions in English based on the film was given to 37 students, who were of Hindi and English Medium.
- After that the film was shown to the students at the (Educational Multimedia research Centre) EMMRC studio.
- The same questionnaire was given to the same group of students as a post-film test.

Analysis

- Students were given marks out of 20.

- The marks for the pre-film-test and post-film test were tabulated separately and marks of Hindi medium students and English medium students were also analyzed separately. Percentages were calculated for pre-film test and post-film test separately so as to calculate the differerence in marks in terms of percentage.
- The difference between the marks reflects the gain in knowledge or the impact of the film on the learning of students.

Result

Table-1: Average Marks Obtained by Students (37)

No. of Students	Marks of Pre-test	Marks of Post-test	Knowledge Gain
Average Marks	11.24	1 5.55	4.29
Percentage	56.2%	77.75%	21.45%

Results indicated that gain in knowledge for the whole group was 21.45%, the percentage of marks for pre-test was 56.2% where as for post-test was 77.75%.

Table- 2: Average Marks Obtained by Engilsh Medium Students (23)

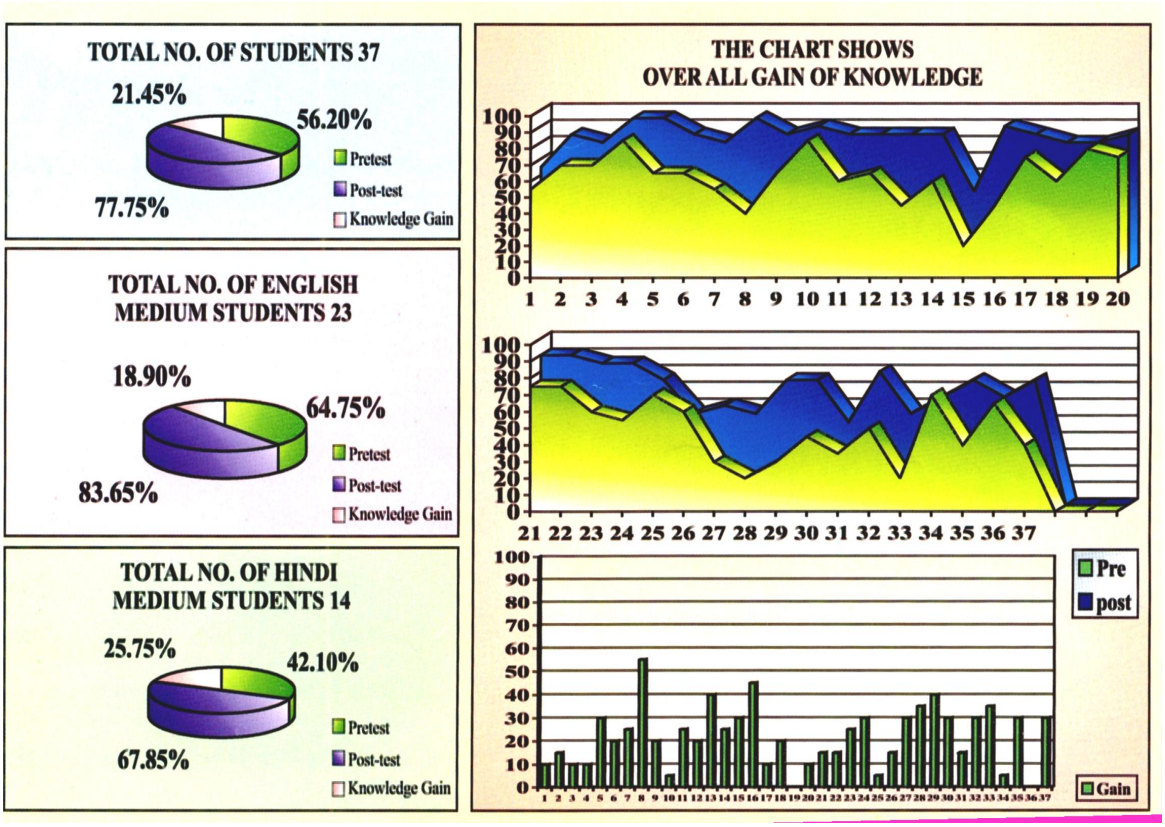
No. of Students	Marks of Pretest	Marks of Post-test	Knowledge Gain
Average Marks	12.95	16.73	3.78
Percentage	64.75%	83.65%	18.9%

The above Table-2 indicated that the gain in knowledge for English medium students was 18.9%, the percentage of marks for pre-test were 64.75% and 83.65% for post-test respectively.

Table- 3: Average Marks Obtained by Hindi Medium Students (14)

No. of Students	Marks of Pretest	Marks of Post-test	Knowledge Gain
Average Marks	8.42	13.57	5.15
Percentage	42.10%	67.85%	25.75% I

Table-3 indicated that the gain in knowledge for Hindi medium students is 25.75%, the percentage of marks for pre-test and post-test are 42.10% and 67.85% respectively.



The gain in knowledge for Hindi medium students is higher than for English medium students as in the pre-test, they could not understand the meaning of many scientific words and therefore they left many questions unanswered, but in the post-test they could answer properly.

To conclude the paper it can be said that E-education is a futuristic endeavour and this is the most apropriate time for its implementation. The initiative, once taken, will add tremendous value to the present teaching processes and will transform them to a large extent. This move will encourage change of mindsets and innovative developments among the academic community.

References

Mathur K. (2005) "Teacher Eduction in the Knowledge Era: Issues, Trends and Challenges", University News 43 (18).

Mathur K. (2005) "E-Education and Edusat: The Journey has just begun", Drishya News Letter of EMMRC, 11(11).

Sati V. & Mathur M. (2004) "Knowledge Gain about Human Development among College Students. Drishya News Letter of EMMRC, 10(6).

Sati V. & Sharma O. (2006) "Manav Vikas (Manav Prajanan Prakriya). Drishya News Letter of EMMRC, 12(9).

Is new always better? The tensions and challenges presented by new technologies in a small developed nation: New Zealand

Beverley McNally
The Open Polytechnic of New Zealand
beverley.mcnally@openpolytechnic .ac.nz

Abstract

The advent of information and communication technologies has created a number of tensions and challenges for many providers of open and distance learning (ODL). This paper discusses the impact of these emergent tensions and challenges on a small developed nation; New Zealand. Specifically, the paper examines the cost of infrastructure, the use of information technology, the requirement for economies of scale and the move from a highly competitive environment to one built on collaboration. There has been an unambiguous message delivered that open and distance learning is the only way to create an educated population in a timely manner, thereby breaking the poverty cycle. However, the costs of establishing a technological infrastructure and achieving economies of scale could mean the new technologies may be unattainable for many. It also creates a risk that small developed nations could slip backwards if they cannot afford to maintain or improve their level of ODL delivery. This means computerised technologies may not be the most effective means of delivery, at least in the short term. The experience of New Zealand is discussed in an effort to provide guidance for policy makers and educators when considering the most effective modes of delivery of open and distant learning.

Introduction

New Zealand is a developed nation that is geographically isolated. It comprises 3 main islands and a number of small inhabited islands, many some distance from the main group. The majority of its population is centred in 4 main urban areas, the remainder scattered throughout isolated farming communities, small rural towns, and small off-shore islands. This situation creates significant infrastructure issues in ensuring equity of access to quality education.

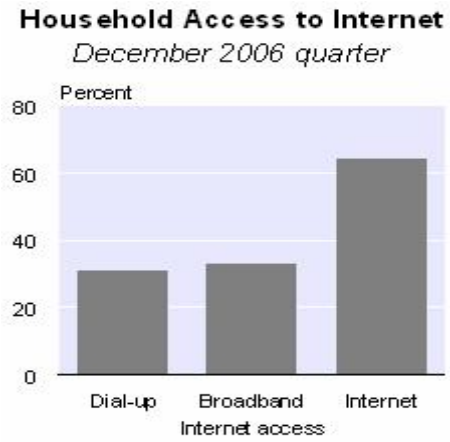
At this point it is important to place the education sector in context. New Zealand supports a large number of tertiary institutions on a limited tax base. There are 33 tertiary educational organisations (TEOs), including eight universities and 20 Institutes of Technologies and Polytechnics. In addition there are approximately 750 private training establishments. These organisations draw their students from a population of just over four million people, this population dispersed over a geographical area the size of the United Kingdom (Grimwood, 2006). Historically, tertiary open and distance learning (ODL) providers have numbered two, one dual-mode university and one single ODL polytechnic. While there have been some international providers, these have been concentrated on post-graduate provision, the two New Zealand providers having the predominant share of the market.

Discussion

New Zealand has traditionally had a high level of provision of ODL. The emergence of this high provision was in response to the need for the country to meet the economic, geographic and educational pressures facing a nation that valued education yet had a limited tax base upon which to base that provision. The ODL approach to education has been shown to be cost-effective, sometimes as low as 30% of total costs of conventional education delivery (Rutland, 2005). Prior to the advent of computerised technology, print based delivery provided the underpinning of New Zealand's ODL provision. Cost-efficient postal systems and government subsidies ensured equity of access and high levels of engagement in ODL. Often the only barrier to provision was inclement weather which precluded small boats, planes and rural mail cars from making postal deliveries. However, the country now faces a situation where significant investment is required in plant and buildings to maintain current capability. This has created issues of economic sustainability for some organisations (Grimwood, 2006). While traditional modes of delivery, for example, print based, have served the open and distance learning community well, the advent of information technology has been looked to with a sense of salvation. Yet it brings with it a new set of challenges.

The provision of information based education via computerised systems requires the learners to have high level access to technology, for example, high speed broadband, to enable the effective access of learning materials. Statistics New Zealand reported in April 2007 that as a country New Zealand is fortunate that it has a high level of engagement in information technology with two-thirds (almost 1 million) households connected to the Internet. Just over half of these connections use broadband technology, while the remainder are dial-up connections (see Table 1). However, the majority of these connections are located in 3 main urban areas with one city having the highest usage at 43.01 percent. In addition, there have been high levels of public disquiet expressed in the media over the past twelve months about the slow-speed provided by many broadband connections. This situation is a manifestation of the level of infrastructure not keeping pace with consumer demand.

Figure 6: New Zealand household Internet access



Source: Welsh (2007) Household & labour force survey

In the 12 months to the December 2006 quarter, 69.0 percent (2.2 million) of New Zealanders used the Internet. The majority of this use was for email, general web

browsing and to obtain information on goods and services. Over 900,000 people made an online purchase, with those aged 25 to 44 years being the most likely to do so (38.9 percent.). *What is notable is only a very small proportion of the total Internet use was for educational purposes.* In addition almost 2.6 million people had personal use of a mobile phone. In the 15–24 year age group, 90.6 percent had personal use of a mobile phone (Welch, 2007). However, the majority of these cell phones were on limited plans such as free texting or prepaid cards.

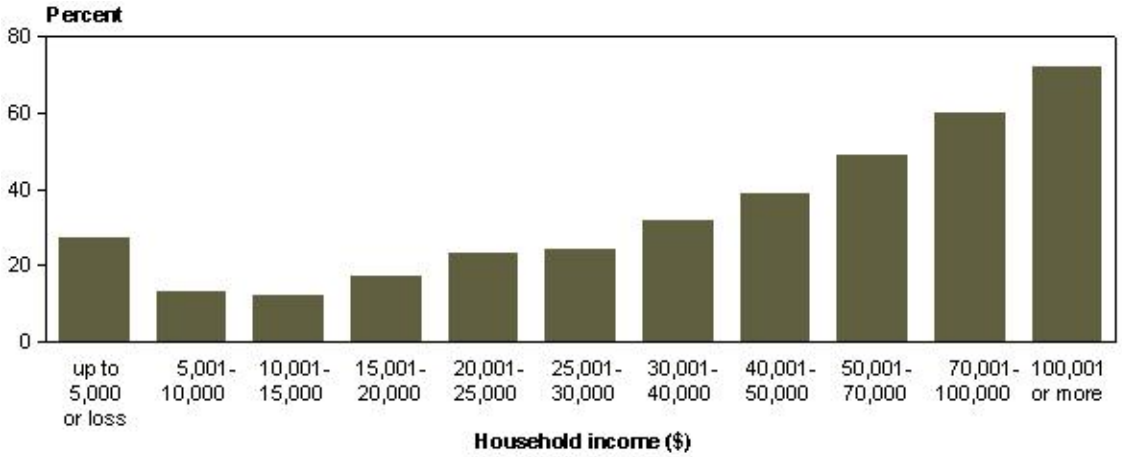
While there is an apparently a high uptake in the use of information technology, there are clearly some gaps in the information provided in the Household Labour Force Survey. While this information is timely there are a number of questions raised as a result:

- While the household may have Internet access, does everyone in that household have the ability to obtain access if necessary? For example, Internet access may be provided by an employer and home access is restricted to the employee only.
- What are the implications for those who live outside the main urban areas and have limited or no access to technology? What is the level of coverage outside the main urban areas?
- There has been considerable debate between ICT providers, politicians, media, public interest groups and users as to the high costs of access. New Zealand purported in 2007 to have some of the highest access costs in the OCED. What is the reason for this high cost of access? Are the economies of scale responsible? Are any changes likely in the foreseeable future?

Significant levels of investment are needed to establish the infrastructure necessary to provide quality ODL via these new technologies. Again, this capability and investment must be derived from a small population with a small tax base and limited government funding. The use of ICT in the provision of ODL having been based on the premise that the technology would be able to provide accessible learning and enhanced learning support in a cost effective manner (Grimwood, 2006; Commonwealth-of-Learning, 2005) then there are implications in terms of cost and equity of access for both providers and students. A high cost of provision translates into the potential for high costs of access unless subsidisation is provided.

Further tensions were revealed in a report produced by Statistics New Zealand (2004) *The Digital Divide*. This report highlighted the emerging gap between the rich and the poor with respect to access to computerised technologies. The level of household income is becoming the primary variable in determining the dispersal of new technologies such as access to the Internet (Welch, 2007). Computerised technology is more likely to be found in high income homes than lower income households (see Figure 2).

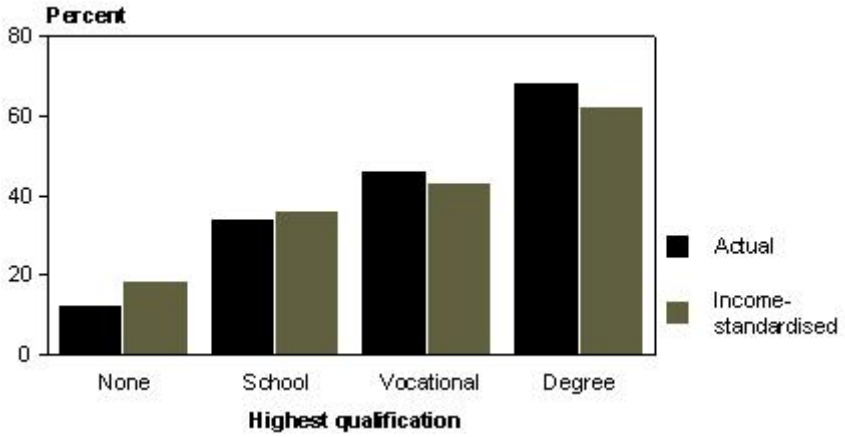
Figure 7: Household internet access by income



Source: Statistics New Zealand, 2001 Census of Population and Dwellings

The second variable is the level of education of the household (see Fig 3), a positive correlation existing between the higher the level of education, the greater the level of access to the Internet. This finding is supported by research from Canada that has identified similar links between internet usage and the level of education achieved (Sciadas, 2002). This situation contributes to the creation of a digital divide between rich and poor, educated and uneducated. If government policy is focussed on the provision of e-enhanced delivery then there are implications for the equity of access to education for the poorer, less well educated people in society.

Figure 8: Household internet access by highest qualification of occupants



Source: Statistics New Zealand 2001 Census of population and dwelling

This digital divide presents challenges for educationalists involved in the delivery of ODL, especially delivery to those who do not have the income or level of education that will enable them to access computerised technologies. This is particularly relevant if these educational opportunities are solely reliant on e-enhanced modes of delivery. The very people that require access to educational opportunities are the very people who have that access restricted as a result of the constraints imposed by income or education levels. As discussed previously, despite its status as a developed nation, New Zealand is a country with limited resources and it is imperative that it invests wisely in education in order to maximise its return on that investment. Policy strategies that are designed to

place a greater emphasis on cost-effective delivery of educational services via e-enhanced delivery may be the very policies that create a greater divide separating the haves and the have nots and threaten the country's status as a developed nation.

As discussed, establishing the infrastructure required for computerised systems is expensive and the cost is often prohibitive, particularly when faced with the country's geographic features, and when economies of scale cannot be realised. While the use of satellite technology and cell phones mean that virtually any part of the globe should be accessible, prohibitive costs mean inaccessibility is the more likely option. The level of funding required for such initiatives is often not an economically feasible option for governments and providers. Therefore, there is a need for a considered approach to the development of ODL. Table 1 is a précis sourced from the World Bank (Potashnik and Capper, 1998). This table outlines the costs in provision of ODL via different modes of delivery. Whilst a summary of the original table, the information indicates there are real issues around economies of scale creating significant cost implications for any move from print based to ICT modes of delivery.

Table 1 Average cost per number of students for each form of distance education

No of students per annum	Cost of different forms of provision per student (in US dollars)					
	Print based	Computer based learning		Two-way technologies		Computer conferencing combined
		Low end	High end	Audio conferencing	Live interactive lectures	
50	–	59.25	322.50	–	–	2.25
125	2.61	18.75	130.50	7.12	67.24	1.81
250	–	11.25	66.75	–	50.14	1.80
625	0.63	6.75	28.50	4.11	14.19	1.69
1250	0.37	4.50	15.75	3.67	29.00	1.68

Source: ((Potashnik and Capper, 1998)

Unfortunately the situation has arisen where many policy makers and providers equate ODL with e-learning, the two terms often being used interchangeably. This, plus the belief that e-enhanced learning is more cost effective, has led to the New Zealand Government embarking on a programme of strategic development strongly focussed on the provision of e-learning. The demands for more cost-effective delivery of tertiary education has resulted in political strategies designed to ensure e-learning becomes one of the primary modes of delivery. The principle behind this thinking is that a national platform for e-Learning would ensure efficiencies, leading-edge provision and currency for learners (Ministry-of-Education, 2004). This philosophy has led to the Government creating the following vision: "to contribute to a networked flexible tertiary education system offering accessible, relevant, high quality learning opportunities to all New Zealanders" (Tertiary-Education-Commission, 2007a). The question is one of how to achieve this vision while at the same time overcoming the tensions and challenges created in the sector as a result of this policy direction.

One response to these challenges has been the creation of the e-Collaborative Development Fund (e-CDF) by the New Zealand Ministry of Education. The rationale behind its creation is the provision of a learning framework setting out priority areas for

tertiary organisations, thereby encouraging their working in collaborative partnerships. It is believed a collaborative approach to building e-learning capability is the most effective, especially when demonstrable benefits can be identified. In particular the Government seeks to encourage a consolidated approach by Tertiary Education Organisations (TEOs) sharing costs and systems where this is more efficient rather than each individual TEO replicating each other's provision (Tertiary-Education-Commission, 2007b). As discussed earlier, New Zealand's geographic features create significant barriers to ODL provision, often making it prohibitive for both the learner and the provider. A collaborative approach aims to reduce the costs of provisio, at least to the provider, these savings ultimately being passed on to the learner.

This approach has itself created a set of tensions. The collaborative direction of government policy is a relatively new phenomenon, occurring in the last 5 years. After nearly two decades of intense competition, including closures and mergers, this new policy direction has created a level of dissonance for many. While tertiary institutions have been forcibly placed in a situation of collaboration, many still have to compete to attract sufficient students to achieve profitability. To do this there is a perceived need for these institutions to develop their own ICT infrastructure and resources, thereby making their organisation more attractive to potential students. Failure to attract the required number of students can result in the economies of scale not being realised. This includes a threat to the organisations' current offerings. As a result, the continuing sustainability of some organisations is compromised. In turn this has restricted their ability to develop and implement new initiatives made possible by the new technologies. *Collaboration to compete* is not a term enthusiastically used in the New Zealand's education environment. In fact, it is a term not comfortably used in many education environments. In addition to being an active part of the network of provision and ensuring quality of provision for the learners, another aim of collaboration is ensure the sustainability of provider institutions. For successful collaboration the following four attributes are required:

1. The flexibility and adaptive structure to work collaboratively in support of the network of provision
2. A more focused portfolio that will add most value to the network while being sustainable
3. A clear market-led and learner centred orientation
4. Economies of scale and a higher level of cost-efficiency (Ministry-of-Education, 2004).

Unfortunately all four of the above attributes are not present at the level required for successful collaboration. The challenge facing New Zealand is to develop these attributes to a point where the country is able to maintain the progress and standards of ODL delivered by the traditional modes of delivery. As the President of the Commonwealth of Learning and former Vice-Chancellor of the UK Open University, Sir John Daniels (2005), states: "education offers the best strategy to break the cycle of poverty, misery and violence". Conventional means alone are unable to meet the challenge. ODL, coupled with the application of appropriate information and communication technologies, can play a central role in delivering quality education (Daniels, 2005b). For New Zealand it is important that ODL is used as a means to ensure its population continues to remain well educated. Maintaining the momentum created in the 19th and 20th century and not allowing its population to 'slip backwards' is

vital. While New Zealand ranks above the OCED average for access to computers and technology, it is still behind many European states such as Switzerland, Australia and the Netherlands. Its rankings are even higher for levels of education (Statistics-New-Zealand, 2007). The challenge will be for the country to maintain or improve on these rankings without compromising the quality or accessibility of educational opportunity.

While the Commonwealth of Learning believes that the advent of information and communication technologies are enabling higher education to reach out on an unprecedented scale (Daniels, 2005a), it is imperative that the tried and true modes of delivery are not discarded prematurely. The tensions created by collaborative environments, and challenges such as cost of provision, geographical remoteness, and delivery to sections of the population previously unreachable must be overcome first. The paradigm shifts and potential gains created by these new technologies being constrained by these issues. However, on a more positive note, these technological developments have brought the vision of a global knowledge society appreciably closer to attainment (Matsuura, 2005).

Conclusion

New Zealand is a small country with limited resources making its way in a challenging world. It is imperative that any investment in ODL initiatives is done wisely and maximises the return educationally, socially and financially (Grimwood, 2006). An integrated system of provision is imperative, one that meets the particularities of New Zealand while at the same time being sustainable and flexible; a system that recognises the strengths of individual institutions and in doing so allows them to work to those strengths in a sustainable manner. It is clear from the discussion that unless the economies of scale are present, then traditional modes of delivery could be the most cost-effective means of delivery for small nation states, both developed and developing. It is important that educationalists and policy-makers dig below the surface and examine the reality for those who are hindered in the equity of access to information and communication technologies. Even in a developed country there is a risk that the country's millennium development goals may not be achieved if this does not occur.

In closing, I turn to comments made by Paul Grimwood, CEO of the Open Polytechnic in 2006; the futurist Herman Kahn has said that the first mistake of forecasting is to assume that existing trends will continue and the second mistake is to assume that they won't. His message is that neither assumption should be adopted wholesale. In a similar vein, the late Peter Drucker said that he no longer tried to predict the future. Instead, he sought to understand what the future might look like by looking very closely at what is happening now.

It is important to recognise that many of the learning experiences and environment of ten years hence are here now.

References

Commonwealth of Learning. (2005) Open and distance learning for development. *Commonwealth of Learning.* Vancouver, B.C.

Daniels, J. S. (2005a) Learning for development. *Commonwealth of Learning.* Vancouver, BC, Commonwealth of Learning.

Daniels, J. S. (2005b) Preface. IN Macintosh, W. (Ed.) *Perspectives on education: Lifelong learning & distance higher education.* Vancouver, BC, Commonwealth of Learning and UNESCO.
Grimwood, P. R. (2006) Distance learning and e-learning in New Zealand's ITP sector. Options and opportunities - Keynote address. *Distance Education Association Conference.* Auckland.
Matsuura, K. (2005) Foreword. IN Macintosh, W. (Ed.) *Perspectives on education: Lifelong learning & distance higher education.* Vancouver, BC, Commonwealth of Learning and UNESCO.
Ministry of Education (2004) Tertiary e-learning in New Zealand: What is e-learning. Wellington.
Potashnik, M. & Capper, J. (1998) Distance education: Growth and diversity. *Finance and Development.*
Rutland, P. (2005) A sector e-learning strategy. The Open Polytechnic of New Zealand.
Sciadas, G. (2002) Unveiling the digital divide. IN Gault, F. (Ed.) *Connectedness Series.* Ottawa, Statistics Canada.
Statistics New Zealand (2007) New Zealand in the OCED. New Zealand Government.
Tertiary Education Commission (2007a) Tertiary education strategy. Wellington.
Tertiary Education Commission (2007b) Tertiary education strategy. Wellington, New Zealand Government.
Welch, D. (2007) Household use of information and communications technology. in Zealand, S. N. (Ed.), Statistics New Zealand.

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