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TECHNOLOGY SUPPORTED LEARNING AND TEACHING WITHIN THE CONTEXT OF HIGHER EDUCATION IN A 21ST CENTURY SOCIETY

JOHN O'DONOGHUE

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requirements of the University of Glamorgan/Prifysgol Morgannwg
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DEDICATION

I wish to dedicate this PhD submission to the memory of my father John Patrick
O'Donoghue (1928-1986). He was an inspiration, who always had faith in me. May he
rest in peace.

ACKNOWLEDGMENTS

ABSTRACT

"The physical environment in which teaching and learning occurs is being replaced with an electronic classroom, but the process of teaching is very much the same. In the second phase, however, we will begin to use technology in new ways, to advance beyond what was possible in the classroom." Downes. (2004).

This overview supports an application for a PhD by publication at the University of Glamorgan. It identifies the tensions, barriers and facilities within the field which is broadly called eLearning, but which I prefer to term Technology Supported Learning. Successful uses of appropriate innovative technologies by staff and students in education is not a mystical or ethereal goal. Real innovation is often driven by the passionate few, frequently developed in their own time and enthused by a real desire to make a difference to the learning of their students. This motivation is not unique, unusual or perhaps unexpected. However the real problem is in 'mainstreaming' this innovatory practice or activity, (O'Donoghue, 2006, p. vii).

As contemporary society becomes increasingly diverse and complex, so does the process of preparing young people for life as independent thinkers, productive citizens, and future leaders. The changing nature of students, the collegiate experience, learning, teaching, and outcomes assessment all have substantive implications for altering educational practice. The information age has encouraged the ubiquity of a seemingly endless supply of information that is there just waiting to be internalised by students who have the ability and the inclination to interrogate the vast range of information systems available. There is a need to consider the relationship between pedagogy and technology in driving the changes to the education process and what outcomes will determine the efficacy of these new learning environments. Pedagogic determinism needs to be focused within the 'real' world of increasing financial pressures on students and educational establishments.

The development of Higher Education Institutions into 'customer' focused establishments competing for students who are, in some cases, reluctant or unable to attend formal educational institutions but who want to acquire qualifications and skills creates problems for both the establishments and staff. There are associated issues which my overview addresses, such as how technology might service this cohort of people who are looking to less formal mechanisms of education, technology versus pedagogy, issues of social learning whilst being remote and yet online, issues and necessary change required if the concept of 'virtual' educational institutions are to be realised.

Higher education is best seen as a process, focused on learning, in which content is combined in some way with some forms of technology, whether they be "chalk and talk," television broadcast, or an IT-based delivery platform. My conclusion is that the development of technology-based learning *support* structures, that is, technology based enhancements to formal teaching and learning strategies embedded in the pedagogy, will assist the education and training sector. In some ways, many of the changes currently going, economic, technological, political, are compelling us to examine issues about how we support student learning, an issue which many of us might prefer to ignore, (Bernardes and O'Donoghue, 2003). I have endeavoured to consider this within a variety of different learning contexts – nursing to engineering, (Drozd and O'Donoghue, 2007; O'Donoghue and Laoui, 2008).

INTRODUCTION TO OVERVIEW

This thesis provides the documentation to support the candidate's application for a PhD by Publication at the University of Glamorgan. The title being: Technology supported learning and teaching within the context of higher education in a 21st century society.

It is divided into a number of key sections, namely:

- The background and introduction which considers the issues surrounding the needs and aspiration of students, staff and the institutions within the higher education sector.

- The changing role and other developments affecting the culture of and within higher education.

- The impact of technology based learning regimes on staff, students and the wider society.

- The methodology.

- The final outcomes or conclusion.

- The professional outcomes and contribution to field of study resulting from the author's work.

- Reference section

- The academic evidence supporting the application for the PhD by Publication.

The relationship between learning and teaching is complicated by the introduction of technologies. These positions have implications for the study for what is termed eLearning or blended learning. It is too simplistic to call this a 'paradigm debate' framed as a contrast between qualitative methods and quantitative methods, (Hammersley, 1997)

In some of the papers, qualitative data such as interviews, focus groups, online feedback and collaboration were considered.

This was further supported by the interpretation of quantitative data assimilated via log files, usage statistics, activity logs and comparison with alternative delivery and engagement. Again this is often difficult as the use of technology is an enhancement of a learning activity not a direct replacement. Even if it is a direct replacement the nature of engagement may well be different i.e. lectures replaced by online forums can not be directly compared. Face to face engagement is fundamentally different to online engagement. Equally the assessment results do not provide any quantitative data as the nature of assessment will be changed as a consequence of the eLearning episode. What is required is a consideration of how different positions would interpret the data and provide an opportunity to triangulate with the resource, constructively aligned to outcomes and assessment located within the viability of 'raising' the intellectual competence and capacity of the student to a higher level. So the term methodology in this context is a determinant whether the implementation of any particular method is successful or credible, from both the student and tutor perspective.

BACKGROUND

The author's involvement with and active engagement in the concerns and preoccupations of practitioners and students has enabled the adaptation of a user centred participatory or action-orientated research approach. This facilitated the development of theoretical constructs grounded in qualitative and quantitative data from 'real' practice, participants and situations but informed by the author's own experiences and observations. Teaching and learning take place in a whole *system*, embracing classroom, department and institutional levels. In a poor system, the components (curriculum, teaching and assessment tasks) are not necessarily integrated and tuned to support learning, so that only 'academic' students spontaneously use higher-order learning processes, (Biggs 2003). In an integrated system, all aspects of teaching and assessment are tuned to support high level learning. Constructive alignment is such a system. It is an approach to curriculum design that optimises the conditions for quality learning. We can add to this the cultural and infrastructural mechanisms within the physical learning environments which can potentially inhibit this alignment. This includes the lecture theatres, labs, classroom social learning spaces and we can add lectures, seminars, class based discussions and workshops. There is also a need to include internal and external policies, processes and procedures. All these affect the concurrency of learner engagement, progression and ultimately constructive curriculum alignment.

The opportunity to utilise the Internet and technology to support the learning environment and learning and teaching engagement and process is immense. Indeed many higher education institutions are endeavouring to engage both staff and students in innovatory learning and teaching practice.

Technology has the potential to support, encourage, extend and enhance the learning of students if used appropriately. It can encourage more independent and active learning as well as being an efficient means of delivering course materials, (McKimm et al., 2003). However the emphasis must be on sound pedagogical design rather than the technology itself, (Downing, 2001). The technology itself does not have to be leading edge or particularly sophisticated, but it must be aligned to the curriculum goals and objectives and the value of any activity facilitated by the technology must be explicit to the students.

A key reason for the use of a technology within a learning situation is to enhance the quality of learning and teaching, it should follow that this use demonstrates the characteristics of good learning and teaching practice. Research over the past twenty years has given some indications as to the characteristics of a quality learning and teaching experience. Educational researchers, for example, Marton and Säljö, (1997); Ramsden, (1992); Biggs, (2003) and Prosser and Trigwell, (1999) have identified qualitatively different student approaches to learning that can be used to characterise the differing ways in which students engage with learning tasks and their learning environment. Research has shown that students' learning outcomes are correlated with these different approaches to their learning, and that a major influence upon how they perceive the nature of their learning is through the methodologies and tasks used by teaching staff, (Kember, 1997).

The early involvement of the author in the educative process was located around simple and limited technological platforms and applications. Many were badly programmed and often based on a "drill n' skill" type practice. The delivery or interface was text based

and interactivity was minimal. When mapped against many taxonomies of learning and teaching, (Biggs, 2003; Bloom, 1956; Gagne, 1970; Garrison, 2004), the engagement rarely moved beyond the concrete, reinforcement or prestructural level. Yet the tools were novel and motivating the students to participate in the learning process. This has been the motivation for the author who passionately believes that technology can make a positive difference to the learning and teaching process. However technological devices, applications and infrastructure have developed and progressed considerably over the last 25 years, yet much of what we still do is limited to addressing the first order or surface approach to learning with limited engagement, interactivity, enhancement and extension, (O'Neill, Singh and O'Donoghue, 2004).

The continued emphasis of the author's work is in the development of processes which utilise a reflective process for both staff and students and extend them into a deeper level of learning. This process enables a learner space to be created, assimilated or instigated. The agenda is to explore the skills, knowledge, expertise and experience of a variety of people which can then populate the 'learning space' which the learner (inclusive of staff), can then access, to make learning more creative, motivational and relevant to individual needs and aspirations. We have moved on significantly from Virtual Learning Environments - transmitting content, or providing repositories of information for access. There is a need to create learners who are resilient, creative and flexible, can collaborate, solve problems, and think critically.

Surface approaches are characterised by focusing on the information and facts of a topic, remembering selected items, and little engagement with any more holistic appreciation and understanding of the wider meaning of issues or concepts and the connections,

similarities and distinctions between these. The use of the lecture as a methodology is often criticised, (Gibbs, 1981; Bligh, 2000) on the basis that this transmission model of learning encourages students to adopt a surface approach. On the other hand, learners who adopt deep approaches to learning, which are usually already founded upon a knowledge base, pursue an active understanding of the underlying concepts, the associations and the relationships between these, and an awareness of how to apply them. Students may be encouraged through the design of, and intervention in, many aspects of their learning environment to adopt either approach to learning, (Trigwell et al., 1999). These may include staff pedagogies and assessment regimes.

Social constructivist perspectives on the furtherance of learning advocate that encouraging collaboration and interaction with peers, and thus exposure to alternative perspectives through an opportunity to negotiate meanings might be a beneficial method of fostering deep learning, (Wenger, 1998). The necessary processes of reflection, self-evaluation, and initiation of new learning are also likely to be triggered and emulated in such collaborative learning situations, (Kolb, 1984).

Kolb's (1984), learning cycle has been expanded on and developed with Cowan's (2006), learning spiral development of the concept. However, this still suggests a relatively linear progression through the various stages. In contrast, the relationship between experiential learning, reflection, the practitioner's established repertoire and knowledge and the development of new levels of understanding is more fluid and cross-referencing than these models suggest. In many ways, the analogy is with the experience of the web, with hyperlinks connecting different levels of knowledge and information, some of which is very 'hard ' and academic, and some of which is 'softer' and more anecdotal or personal.

A learning web suggests more interconnectivity between the various elements of the process, with feedback loops and crossovers operating in addition to more linear unidirectional growth with the possibility of fostering a deeper level of learning and learner engagement.

Group work as a methodology in face-to-face situations may well promote a deep approach to learning. It has a well-established rationale and is the cornerstone of pedagogic approaches such as problem-based learning, (Biggs, 2003). The uses for technology based learning map onto this ideology, commonly enabling staff to do the following: give access to course materials such as notes and assessment briefs; use discursive tasks involving peer-peer collaboration; provide objective formative assessments; and enable staff to observe frequency of learner engagement with the course.

The benefits to learning of the use of formative assessment and the feedback which it provides are well documented both in and outside eLearning, for example Boud, (1995) and Black et al., (1998), with researchers, such as Charman, (1999) demonstrating improvements in performance with computer-assisted formative assessment, which is 'just-in-time', when the students want it, rather than at the end of the course or semester, when it is often too late to rectify areas of error. The collaborative asynchronous tools may promote increased communication between staff and students and between students and students and used with the appropriate learning tasks are seen as being allied to constructivist learning, (Laurillard, 2002; Salmon, 2000; McConnell, 2000).

The use of collaborative, discursive tasks and problems mediated by asynchronous discussion tools is seen to promote the higher order critical thinking and learning which university education seeks to develop.

The barriers to the use of technology within education are often blamed on the more tangible assets i.e. communication links, limited hardware, inappropriate software etc. This is understandable, but equally easily addressed. The real and more difficult issues are with the culture, nature, motivation and resistance to change within institutions, establishments and infrastructures and the staff within them, (O'Donoghue, 2006, p viii). Allied to this we have cultural and political barriers. Students are often remote, isolated independent learners, who need some reinforcement of their understanding, or lack of it, and the application of learning constructs. Arguably, we ought to be advocating a deeper approach to learning for our students, but increasingly as the pressures on staff increase, students become more demanding as paying customers. The ratio of students to staff then rise and the context of independent activity based learning become progressively more difficult. As suggested the use of innovative technology application and support within a context of problem based learning may well promote an environment of independent, autonomous, activity based learning . Whilst all these learning resources could be provided in different forms without use of technology, electronic provision can extend and enhance the range of their availability.

Whilst breaking down some of the physical and social barriers and inhibitors to learning there is the potential to develop a support environment utilising technology which would enable the students to develop their skills, acquisition and application of knowledge as well as to achieve their learning outcomes at a self-determined autonomous self-

determining level. The desire is to achieve a much deeper approach to learning, linked

intrinsically to the learning outcomes, (Marton and Säljö, 1976). It was in this context

that the research and development has progressed. The manipulation and experimentation

allowed within the technology supported learning environment enabled exploratory

(information acquisition) and confirmatory (knowledge construction) to be experienced

and practised by the student, and staff members.

Changes are required on a number of levels to recognise operational and strategic

imperatives – online contact time, out-of-hours working, course production, development

of additional skill sets, a move from lecturing to facilitation. This can be addressed by an

institutional policy and development infrastructures which support staff and inform what

is considered effective use of technology in learning and teaching, (Moron-Garcia, 2006;

Kent, 2003). The best model appears to combine technology enhanced learning including

the scenarios, animations, discussions and debate with the more traditional methods,

(Wheeler, Frawley and Davis, 2000).

The main driver, pedagogy and learning, has already been espoused, but is based on the

need to create a shift away from the transmission model of lecture-based courses to one

where students take greater responsibility for their learning, i.e. independent, self-

directed learning.

Lectures do have a role in motivating students and maintaining a sense of common

purpose, and increasingly, lecturers are deploying student-centred activities which

encourage them to reflect on the lecture content and provide the opportunity to refresh

and consolidate what is being delivered. Learning online is no longer exclusively

associated with distance learning and is becoming a significant part of the experience of campus based students. Use of online learning to increase flexibility and enhance learning is widely assumed to foster a deeper more meaningful engagement. Yet many implementations are limited and superficial, and focus on delivery rather than enhancement or engagement. What is included here is a critical review of student and staff perspectives and a study of the learning contexts and pedagogies. Not surprisingly the diversity of institutional, society and political dimensions often cloud the creative and imaginative use of technology within the context of learning and teaching, (O'Donoghue, Singh & Singh, 2002). A rationale for campus based activity is the opportunity to utilise a multi faceted approach facilitated by technology which enable enhancements to the more formal delivery and learning centred activity. Many studies have focused on the pedagogic design with some evidence of good practice, and what this might mean. Constructivism has become the dominant theoretical basis for learning technology development, (Jones & Mercer, 1993). Learning technologies have the potential to promote deeper learning through the use of communication to build up knowledge and understanding through collaboration, reflection, feedback, formative assessment and participation in learning communities, (McCormick & Scrimshaw, 2001; Laurillard, 2002).

INTRODUCTION

The speed and rapid growth of information and communications technologies is well
documented, (Moores Law, 1965) and has enabled many new and exciting developments
in the last few years or so, opening up new possibilities in all sorts of different fields,
including higher education.

The emphasis within technology supported learning is in the development of online
support, independent motivation and active facilitation NOT wholesale replacement of
academic input. Biggs and Telfer (1987), suggest that the following types of teaching
foster deep approaches:

- an appropriate motivational context

- a high degree of learning activity

- interaction with others, both peers and teachers

- and a well-structured knowledge base.

This interfaces well with the concepts of Biggs (2003), Marton and Säljö (1997), Prosser
and Trigwell (1999). This overview paper sets out to present some of the recent
developments in education in the information age (not all of them technological) and in
particular higher education. Some of the advantages and disadvantages of online distance
learning are discussed, the issues and challenges for the traditional universities presented,
as well as the impact on teachers, management, organisation and society. There is a wide
body of research generally on what constitutes good learning; from more didactic
instructionally focused theories through to those emphasising a socio-cultural

perspective. The structure of the papers are located with a variety of contexts. They inevitably overlap and whilst each makes a distinct contribution they do need to be considered as a whole. Conole (2008), argues that in essence good learning is a combination of four things, learning through: thinking and reflection; conversation and interaction; experience and activity; evidence and demonstration.

The matrix below summarises the stance which the author has taken in the inclusion of the published papers. The papers consider the changing nature of the customer base, the institutional factors, associated resource implications as well as the changing technological environment. Added to this there is a need to recognise the changing nature of students and the need to consider more active, participatory learning as well as the more formal lecture based delivery.

Learning→ through	Thinking and reflection	Communication and interaction	Experience and activity	Evidence and demonstration
Pedagogical Issues				
Infrastructural and Cultural Issues				
Technological Issues				
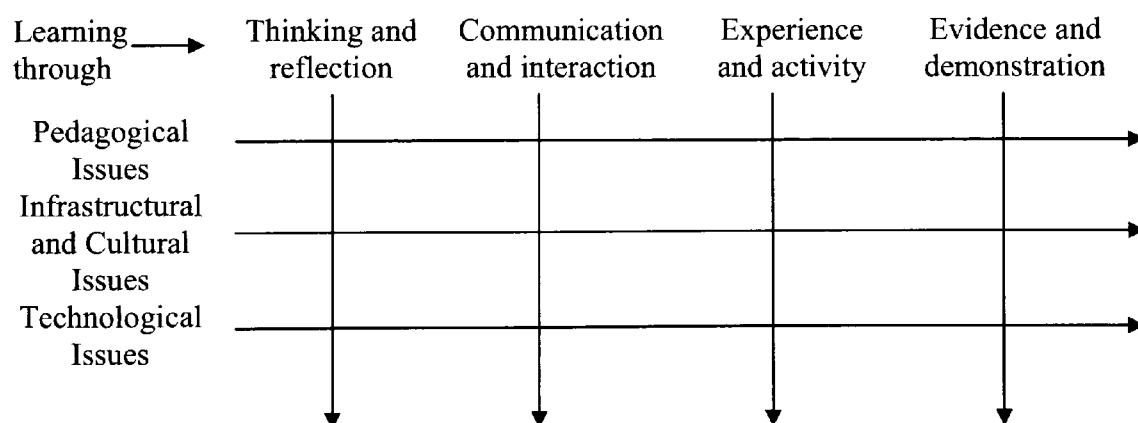
The matrix does not illustrate adequately the mapping as the opportunities for communication through experience, thinking and reflection are not accommodated within the table above. Conole (2008), goes on to describe a schema which uses this framework as a means of mapping learning principles and argues that such schema can be used by teachers as a means of designing learning activities. This is illustrated below
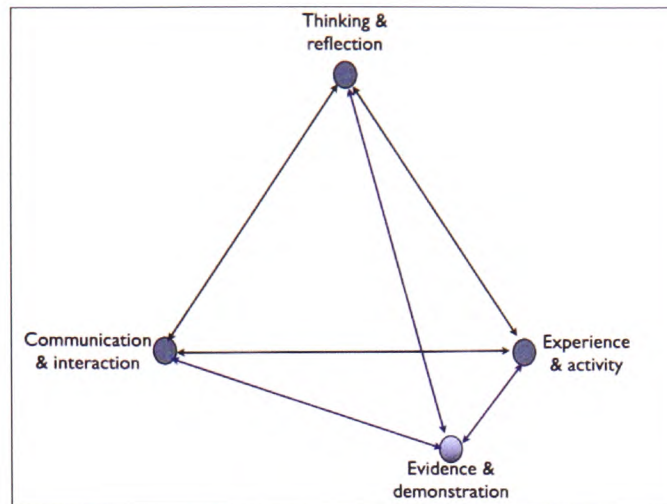
What is clear is that HEIs are changing and the students who attend them are also changing. The physical presence of a student in a lecture theatre is no longer a prerequisite for learning or learner engagement and participation. This is supported by the in depth analysis and review by O'Donoghue, Caswell and Singh (2000), where they considered the roles of students, staff and institutions in a changing learning environment.

The acquisition and application of knowledge within a variety of context is becoming a part of the strategy in developing a lifelong agenda for education. In the last century there was an expectation of a job for life. This is no longer the case for the vast majority of us and is even less so for future generations. 21st Century workers will have a variety of different careers and jobs and will have to be sufficiently adaptable, versatile and flexible. They will need to be trained, not to do a specific task or tasks, but on how to assimilate the requirements and needs for a multiplicity of work situations and applications. The figure below illustrates the changing lifestyle pattern, moving from cognate stages or milestones within a more traditional learning domain to a more flexible, open, learner led approach, (O'Donoghue, Singh and Dorward, 2001).

The traditional lifestyle pattern

EDUCATION TRAINING WORK RETIREMENT

The new lifelong learning pattern

EDUCATION

TRAINING

WORK

LEISURE/RETIREMENT
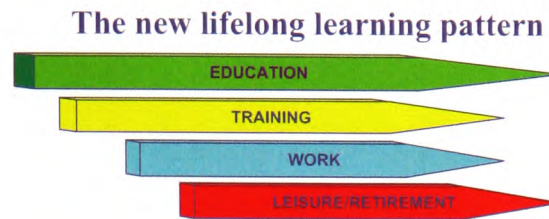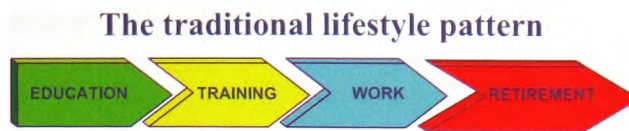
O'Donoghue, Singh and Dorward, 2001

This is further supported by the Singh, O'Donoghue and Worton (2005), paper which considers the organisational and environmental impact of technology on higher education and the need to become more business focused.

The learning environment is undergoing a transformation. This requires some clarification which is considered by Singh, O'Donoghue and Worton, (2005). They consider whether learning is being transformed or the mechanism by which students engage with learning and teaching? They argue that the process of student led, autonomous, activity based learning, as iterated earlier, is or can be seen as threatening to the 'traditional' didactic lecture driven format.

This is consolidated by the O'Donoghue, Singh and Singh (2002), exposition who regard the student increasingly as a paying customer expressing demands for knowledge, engagement, delivery and resources as the cost

This challenge is intensified by changes to the competitive environment where, in the wake of lifelong learning, as shown in the Figure above, traditional institutions are competing with corporate and virtual universities particularly for the mature student population. Universities should be aware that dependent learners will require courses

tailored to suit their educational needs, potentially offering a blend of face to face and virtual interaction, (O'Neill, Singh and O'Donoghue, 2004).

The context of higher educational change and the role of technology is summarised within the O'Neill, Singh and O'Donoghue (2004), paper. This paper presents a review of the current state of technological interventions and the implications on the organisational structure, changing focus, global competition afforded by web based delivery mechanisms and the issue associated with maintaining a quality based yet coherent curriculum which the staff and students can engage in and with.

What is apparent from this review is that most institutions purport to offer some form of online engagement. This does vary from using technology to support a repository of guides, notes and presentations through to active and interactive ePortfolios and online interaction, collaboration and engagement.

In this information age of global competition some of the more traditional universities, both in the UK and abroad, have anticipated this move towards online higher education and started making courses or parts of courses available over the Internet. For example, the Open University (OU) based in Milton Keynes, which has for over 50 years been providing part-time degree courses through the postal system now has a number of courses which are studied entirely over the Internet, with little or no face-to face interaction. Although the mode of delivery is still based largely on textual material, albeit accessed via the Web, the only additional functionality is conferencing online.

Despite the structural differences that distinguish the OU from campus Universities, the problems that both parties face regarding the implementation of technology are not too dissimilar. To begin with, the OU is not envisaging a rapid and comprehensive switch to new technologies and are proposing, instead, a gradual move to a mix of traditional distance learning methods and technology-based methods. Over a five year period, from 1997 to 2003, they decided that:

> '..the total proportion of student time spent on technology-based study is approximately one-third, which for most courses will be sufficient....'
> (Laurillard, 2001)

One of the major problems which many institutions have faced is how exactly to bring about the implementation of an IT-based culture within the context of a learning environment, (O'Donoghue, Singh, and Dorward, 2001). While there is a common belief in modern universities that management skills are universal, it may well be that management of IT projects require not only IT skills but also participation in the project itself.

Whilst endeavouring to map against the above pyramidal model, it is not quite as easy as it appears. On one side the passion of some staff who are keen to explore and use new and emerging technologies in their engagement with students is predicated on what is often perceived as institutional intransigence and bureaucratic legacy systems. Equally there are staff who feel threatened by this technology or believe that it will impede the students understanding of fundamental and necessary parts of the learning process. I have mapped and outlined my paper contributions against the Mayes and Fowler (1999), framework who present a simple three stage model. Inevitably there are overlapping considerations. This conceptual framework for approaching the pedagogy of online

learning is one which attempts to illustrate how each stage of learning needs to be supported by a different kind of technology. This offers a pedagogical rationale for designing the technology. The framework describes what in the pedagogical consensus are the three main elements of a learning process – conceptualisation, construction and dialogue. It also incorporates the idea of a learning cycle – acknowledging that learning is not a one off process (a view unfortunately encouraged by the nature of our assessment methods) but involves continuous (even lifelong) revisiting and tuning of concepts and skills.

Conceptualisation - is the process of coming to an initial understanding through contact with, and exploration of, a new exposition of some kind. A number of papers are located within this area. These are located around the institutional, cultural and changing agenda of higher education. The student body are becoming increasingly demanding especially as financial constraints are placed upon them. Consequently the accountability of staff to their content and engagement in learning, lectures and seminars are changing. Technology has an increasingly role in this. From placing course materials within the institutional Virtual Learning Environment (VLE), to forums and online discussions which are delivered asynchronously to enable students who have part time work commitment to participate. The institution is not easy or susceptible to change and have significant physical assets to support as well as the lecture theatres. What these papers consider is a recognition of the current scenario as well as the need to develop coherent and consistent approaches to recognise and quality assure.

This was illustrated in a case study by a lengthy misunderstanding about the usability of the delivery platform. Bernardes and O'Donoghue (2003), reviewed some staff using the VLE for teaching and found that some elements simply did not work and the lecturers reported this to their representatives on the management committee. The representative of the software developers reported that the complaints were a result of misunderstanding and staff ignorance rather than software failure. The management committee itself, because few members actually used the development platform, was incapable of verifying either story. Those using the software, after some months of making complaints, simply adapted the way in which they used the software to avoid problematic areas and the problem appeared to have been resolved. The final solution was to turn the error reports into a management issue about the quality of managing software performance, (Bernardes and O'Donoghue, op cit).

The ability to rationalise and consider the wider picture and the possible technological intervention within the learning and teaching process are clearly major issues at the organisational, management level.

This is illustrated in the Graham and O'Donoghue paper (2002), where the demography and local rural isolation was positively affected by technological intervention. Significant and active participation by students and members of the rural community was clearly apparent and there is some evidence of improved social and community engagement fostered by online collaborative activity. The students did need some scaffolding in which to base their 'virtual' existence in an often alien and unfamiliar environment. This is true for campus based engagement as well as access in remote locations and home

O'Donoghue, Singh and Singh (2002), consider that the creation and implementation of quality online learning is not simply a question of putting existing lecture notes onto the Internet. It requires special skills to identify what multimedia method would be the best for delivery of an online course. Should the teacher use a group discussion via videoconferencing or simply accept basic email messages from students and be swamped by emails? Decisions that can only be made with experience and after extensive investment in staff training and awareness raising and often a collegiate approach and multiple skillsets developing what is regarded as an innovatory or engaging and aligned curriculum. This is supported by Porter (2000), who comments that true learning is not a passive experience, it should include analysis and debate, so just reading lecture notes online is not going to get students very far. Also, if lecturers are to produce effective materials and have successful online interactions with their students they must first of all be willing to do so and receive the specialist training necessary, (Furnell et al., 1999).

Construction - involves some activity in which the new understanding is brought to bear on a problem, and feedback about performance will be gained. The development of technology based learning and teaching resources is non-trivial and relies on the subject knowledge interleaving with IT specialist and education developers and designers. This is introduced in the O'Donoghue, Dalziel, Fleetham and Molyneux (2000), paper which considers the development and introduction of an institutional virtual learning environment. This is further explored and elaborated by Bernardes and O'Donoghue (2003), who explore the culture shift in terms of understanding what technology is and what it might be able to achieve. The shift to focus more on learning outcomes in recent years may make this process less painful, but the development of IT delivery platforms requires academic staff not only to rethink what they deliver (Should I amend that

lecture, since students did not appear to understand the argument?), but also how they deliver their content (What kind of activity will enable students to understand the argument?). In the short term, it is likely that IT-based delivery systems will be seen as the most appropriate alternative means of delivering content, if only because of the Internet and the massive spread of IT-based solutions in our lives, (Bernardes and O'Donoghue, 2003). A fundamental requirement is to align learning and teaching with media and technology. If we can then relate this to contemporary models of learning outcomes, we will potentially have a curriculum which deepens understanding, stretches student's knowledge ability and application, as well as their understanding of possible complex structures, (Biggs, 2003). This facet is developed further into personal student portfolios, (O'Donoghue and Bernardes, 2007). Here the onus, management and ownership of the content is on the student. This is a very different model to the VLE where the management and control is in the hands of the institution and staff. Students particularly valued flexible access both from home and on-campus, but also to their own content, reflections and personal diary. It appears to be important that students understand the role of technology in their learning and the implications for their study strategies and engagement in learning activities. Many lecturing staff face considerable barriers to effective implementation on reversioning of their learning and teaching resources. This is not merely at the local personal skill level in creating what might be HTML or technology based applications, but also at the institutional, policy and cultural level.

While technology inevitably changes the role of teacher or lecturer, it also needs to be recognised that the adoption of technology may also change the role and dynamic of management structures, (O'Neil, Singh and O'Donoghue, 2004). Clearly the

development of an institutional Virtual Learning Environment (VLE) will need to be incorporated into the wider institution information system, i.e., a Managed Learning Environment (MLE), (BECTa, 2003; BECTa, 2008). This will enable the integration of student records and finance into the learning system, (O'Donoghue, 2003). Such integration will potentially enable the importing of data into and across the VLE into evaluation, consolidation and reconciliation of the status of the student within the context of their learning, (Ballantyne, 2003; Dommeyer et al., 2004). Such systems may provide more relevant and timely monitoring and feedback to department, faculty, staff and students, (Yinung et al., 1998).

The integration of new forms of working, study, learning and delivery of resources requires skilful management by those advocating technological implementation and integration. A number of institutions and faculties need to contemplate, observe and examine the social and cultural impact of a technological approach on their staff. The nature of change from a didactic teacher, font of all knowledge to facilitator is non trivial and very threatening to a number of staff. There is a need to acknowledge that active learning within a technologically based environment necessitates the establishment of a theoretical framework as part of the learning process, (Manning, Cohen and DeMichiell, 2003). This realisation will mean that the use of technology is not about replacing learner process, but enhancement and extension of such. This is most important if we are not to simply 'cut and paste' content, which may have worked in the lecture theatre, into virtual and technology based learning environments.

The critical factors for success will change with the implementation of eLearning programmes: prior experience of using technology; the technological infrastructure; and

the lecturer will be the new key elements in the success of the learning experience. HE institutions can help students to achieve success by doing three things. Firstly, a face-to-face session familiarising students with the courseware will help to overcome the any concerns or issue of prior experience within such domains. Secondly, the functionality of the technological infrastructure should be ensured before the course is implemented. This should be backed up by technical support from either the lecturer or a course facilitator. Finally, human resources should be committed to the project at an early stage and lecturers should be selected based on their attitude towards technology, teaching style and ability to comfortably manage technology.

For lecturers, eLearning programmes represent a change in teaching style. The precise nature of the change is difficult to quantify, however allocation of sufficient time and resources, combined with managerial support, will help staff through the period of transition. Effective management can also help institutions to deal with any increase in lecturer workload by ensuring efficient use of resources, (O'Neill, Singh and O'Donoghue, 2004).

Dialogue – involves the full integration of the new understanding with the learner's general framework of knowledge emphasising here the crucial role of discussion and reflection as the new understanding becomes applied to performance. This is the stage at which aspects of expertise begin to appear, and the learner begins to use the new understanding, or practice the new skill, in the context of real application. Allied to this the changing role of the lecturer for the didactic delivery of knowledge to a facilitator supported by technological intervention especially as we increasing look to Web 2.0 and

semantic platforms and networks. This is where the learning is often in the hands of the student and the teacher or lecturer is seen as part of the process, rather than leading it.

The constraints and limitations of the staff who are limited technologically and often pedagogically create major issues for support.

With the availability of increasingly sophisticated Web 2.0 tools to support social learning online viz a viz FaceBook, MySpace, BEBO, Twitter etc. The opportunity for interfacing with like minded individuals and groups is potentially provided. Many of these social groupings are work specific but many are located in a world where social interaction is predicated on conversational exchanges, (Franklin and Van Harmelen, 2007).

Many staff who will feel culturally and technologically challenged, isolated and insecure within this new role require a technology which encourages them to experiment at a low level of IT competence, and yet see the benefit of such interventions. This is reflected in the Drozd and O'Donoghue (2007), paper where the technological implementation is not at the leading edge of computing. Indeed the use of this simple technological interventions, i.e. WebQuests, were seen to create an environment of active, independent learning. The additional benefit being that the member of staff gained significant in her confidence and utilisation of technology in her teaching.

This is further illustrated in the work within materials science (Laoui and O'Donoghue, 2008), where the need to animate electron and atomic structure movements with a PowerPoint presentation limited the knowledge acquisition and understanding of the students. The lecture content was animated via Flash[©] and then presented to the class.

Ultimately the development became a standalone interactive activity for them in which they were able to engage, amend and use as a challenge to their understanding rather than, as previously, been presented as formal lecture dissemination of information and knowledge

For staff the support must be beyond training in software use. There is a need to recognise that technology fundamentally changes the potential learning environment, (Laoui and O'Donoghue, 2008). This is where the existence of physical assets e.g. lecture theatres and formal delivery practices and processes mitigates against other alternative strategies, (O'Donoghue, 2006). This raises significant issues about whether we want to simply interleave existing practice within technology or to develop a new modus operandi utilising technology. Over the recent past some naive attempts have been made to address some of these issues. The most simplistic solution adopted by some institutions has been to invest heavily in technology. It is actually a relatively painless, one-off capital cost to purchase hardware to introduce technology, videoconferencing and large labs of PCs with very powerful software. Significant investment has been made in technology within schools, colleges and universities. O'Donoghue, Singh, and Caswell (2000), suggests that while staff have readily taken up email and to some extent the Internet, their deeper adoption of the technology in the context of learning delivery has been limited.

There is a tension between technology and pedagogy in a virtual university context. The inference or suggestion is that IT has the potential to improve pedagogy if staff use it as a tool to enhance not replace. This creates a dilemma for senior management who often see the IT implementation and infrastructure as a replacement for a costly staff resource, (Naidu et al., 2000). IT is, or should be seen, in the role of enhancement, extension and reinforcement of good practice.

According to a research pilot by Singh and O'Donoghue (2001), of a study of mature part time business students exploring the socio-learning environment of online programmes. The students responses proved to be overwhelmingly positive and often enthusiastic about the amount of flexibility offered by online learning, and whilst isolated physically they were more than happy to engage in working with other students and peers. Relationships can also be fostered within the context of an online environment and is a powerful medium particularly for part time work based students who find the erratic attendance patterns and study difficult, (Singh and O'Donoghue, op cit). This also supports the assertion that some students will converse via an electronic medium, but within the context of a lecture or seminar they remain shy and silent. Caution does need to be exercised though as what has been experienced demonstrates that simply including an online component, even with some face-to-face preparation, may not be enough to create community broadly across a group that allows everyone to take advantage of the reflective context offered by the online environment.

METHODOLOGY

As I was concerned about process, and less about content (although clearly this is important), I chose to embrace an action oriented or participatory approach. As a teacher and researcher this enabled me to make senses of what was happening and reflecting on this. Then transferring concepts, constructs or applications into perhaps more 'alien' or less receptive settings. The research is grounded in meaningful assumptions about the nature and need for active learner engagement supported by technology. This was positioned around:

exploratory research – the problem, issue, area of non activity or engagement was identified. These were structured and identified using secondary research such as reviewing available literature and/or data, or qualitative approaches such as informal discussions with students, staff, administrators, management, and more formal approaches through in-depth interviews, focus groups, case studies or pilot studies;

constructive research – possible scenarios or solutions were considered, the conclusions of which objectively argued and defined. This involved evaluating the construct being developed analytically against predefined criteria where possible or appropriate;

empirical research – the feasibility of a solution was framed against the known parameters and constraints, evidence on the viability of an existing solution was provided and attempts to describe accurately the interaction between the technology, learning and teaching was observed.

The primary research focus was located around an action research methodology which allowed for context-specific cycles of action, data collection and analysis, reflection and planning, providing evidence that informed teaching, learning and policy practice in the delivery of technology influenced and supported programmes of study, (McNiff and Whitehead, 2005; Kemmis and McTaggart, 2005). Continuous student and staff feedback were used to drive iterative improvements to the whole process of innovation, consolidation and recognition of the role of technological intercession across learning, teaching, technical, content and institutional processes, (Eden and Huxham, 1996; Gill and Johnson, 1997). My focus is located in the area of technology making a difference to the learning and teaching process, and what this might mean and I support the ideology that motivation, critical for effective learning, needs to be sustained through feedback, reflection and active involvement in order for the designed learning to occur, (Garris et al., 2002). Hence the use of participatory action research.

Action research or participatory action research is a recognized form of experimental research that focuses on the effects of the researcher's direct actions of practice within a participatory community with the goal of improving the performance quality of the community or an area of concern, (Dick, 2002; Reason & Bradbury, 2001; Hult & Lennung, 1980).

Wadsworth (1998), identifies the key characteristics of 'participatory action research': the researcher is a participant, the researcher is the main research instrument, it is cyclical in nature, involves action followed by reflection followed by informed action, and is concerned with producing change. This change is ongoing throughout the process, and the research is interested in input from participants and stakeholders.

This allows for the continual development and improvement of the projects based on the feedback from participants at regular points in the projects.

An action research methodology was used, creating a reflective research environment that continually seeks to improve the student learning outcomes based on regular student and lecturer feedback. The action-oriented or participatory approach was adopted because it supports a close coupling between my everyday practices as a learning technology professional involved in teaching and supporting learning about, learning technology *and* my practices as an educational researcher. This close linking between teaching and research practices, enables me to make sense of research ideas generated directly through my own practices and my experiences within the teaching and learning context. Conversely, the practical experience of teaching and the support of learning using technology in a professional development context has been directly relevant to the research activities.

The approach of the tutors in allowing cross fertilisation and conceptual development of the student and tutor and environment must be fostered. It must allow various partnerships into which students will enter. Successful learning depends on success in establishing and developing such partnerships and affiliations - with tutors and with collaborators.

I would further argue that my closeness to, and active engagement in, the concerns and preoccupations of learning technology practitioners, has enabled me to adopt this highly user-centred, participatory or action-oriented research approach (e.g. McConnell, 2002; McNiff, 2002; Salmon, 2002; Levy 2003), and to build theoretical constructs that are

grounded in qualitative data from real practitioners (Glaser & Strauss, 1968), but that are also informed by my own experiences and self-reflective observations (Marshall, 1999).

Action research is a form of self-reflective enquiry undertaken by participants in social situations and validated in practice, (Kemmis, 1982). Action research might be defined as 'the study of a social situation with a view to improving the quality of action within it'. It aims to supply useful ways to help people act more intelligently and skilfully. It provides close linking between the research process and its context, and it is predicated upon the idea of research having a practical purpose in view and of it leading to change, (McNiff, 2002).

In action research, the research process is seen as a spiral activity going through repeated cycles and changing each time. It is therefore seen as a continual and integral process of linking research and practice. It is an approach or methodology which enables researchers and their participants to learn from each other through a cycle of planning, action, observation and reflection.

This research work has been largely user-centred and highly participative, and this has enabled me to gain a better understanding of user needs from the user perceptions elicited. The work has also involved the active collaboration of research participants as shapers of the research process. The work has been designed around authentic tasks using an action-oriented approach, building theoretical constructs that are grounded in qualitative data.

Kennewell (2001), suggests that the many variables associated with the pedagogical context influence the use and role of technologies and the overall success of teaching goals more generally. These variables include teacher and student characteristics and preferences, the pedagogical approach employed, the organisation of the learning environment as well as the omnipresent disciplinary and institutional culture and norms. From a constructivist position, Day and Lloyd (2007), offer two references to illustrate the integrated and interactive relationship of the pedagogical context with teaching and learning. The first reference is from de Figueiredo and Afonso (2006, p.12) where pedagogical context encompasses variables that are 'woven together in the act of learning, rather than around it, as conveyed by the word "environment"'. The second reference from Moschkovitch and Brenner (2000, p.463) suggests that the pedagogical context can be understood as 'the relationship between a setting and how participants interpret that setting, including the meaning of practices'. These definitions and operational understandings of the pedagogical context frame the analysis of the application, integration and utilisation of technology within learning and teaching.

A variety of tools were considered and used either an online survey tool, a researcher or tutor to conduct the interviews. This was much more productive. The interview started with students who were considered as effective users of the system. During the interviews students and staff described in detail their excitement and disillusionment with and during the first few weeks when the initial optimism (concerning what they could accomplish, plans about how they would conduct themselves, and the nature of the relationship with the system) confronted by the reality of the involvement or engagement in a programme of study, developing online resources and the institutional hurdles.

Descriptions of a variety of issues and aspects, the changing nature of learner

engagement and participation within the material were common themes. The relationship

of the students and staff personal competence and lives are all issues for both the learner

and the delivery mechanism. Discussions also considered the relative merits of study in

comparison to previous educational experiences at a variety of levels. From these initial

interviews a loose descriptive theory of the online and technology supported learner

experiences and effectiveness was explored and developed. It consisted of a model

whereby the students valued the availability of the course at a time to suit their lifestyle,

but its effectiveness is defined differently depending on the learner familiarity and what

stage they are at in terms of study i.e. a top up degree course, so have had little study

input recently or are returning to study, so a major learning and social curve to assimilate.

So the theory that the system is not just effective in delivering learning materials, it also

provides an opportunity for independent self-study, was used as a basis for the

subsequent interviews. For staff the support must be beyond training in software use.

The intention was to collect descriptive data and analyse this, then consider

questionnaires, unstructured interviewing and document analysis. The design was

flexible in as much the initial questionnaire informed the second one which set an agenda

for the interviews.

In a number of the papers this was then followed up with a more detailed questionnaire. It

included some background data collection but focused more on the experience of online

learning in the broadest sense i.e. forum activity, formative assessment, institutional

barriers to participation, isolation via remote learning etc.

Where possible it, the questionnaire, was delivered to the students towards the end of the semester in which they studied, and before their respective results were announced.

The impetus for the interviews was to expand on the responses extracted and summarised from the questionnaires. The author's interest was in collecting data about the effectiveness of the learning not the technology itself. Initially the interviews were conducted by the author. In some cases this was not particularly successful as the students made some assumptions about the technical background of the interviewer and therefore made assumptions about what answers were being sought. So despite requests for 'What was the experience of online learning like for you...' The responses invariably ended up about the interface, and its associated problems, failures and successes. Such responses as 'It worked well with IE6, but I had difficulty with IE7...' were common.

There was a need to consider, research, develop, acknowledge and exploit:

- the new emphasis on social contexts for learning;
- that learning occurs outside the classroom environment;
- the removal of traditional boundaries to learning.

In a number of situations the theory was modified again and adjusted to fit the new case. Clearly this enabled positive responses to be extracted, but the interviewees also provided examples of negative cases. This limited the evolving model, but nonetheless the staff and student experience was taken into account.

What did happen as a consequence of the interview process is that the initial assertion that online learning is a good thing, was tempered very much by the attitude, position and stance taken by the member of staff, student or organisation.

There was a need to be aware of the need to respect and have due regard to ethical issues for all the participants, both active and passive – technicians, programmers, tutors and students, as well as the institutional administrators and staff. The questions, interviews and actions are embedded in an existing social organisation and due respect for such structures was required. The standards defined by the Centre for Applied Research in Education, (MacDonald and Walker, 1974; Simons, 1987), were applied to create a standard and consistency of approach. The data was reviewed, analysed and cross referenced where possible as per the Evidence for Policy and Practice Information and Co-ordinating Centre[1], (EPPI, 2001) recommendations. Over time many of the key research questions concerning the scope and criteria for inclusion of different topics evolved and changed as both the environments and technology changed.

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[1] Evidence for Policy and Practice Information and Co-ordinating Centre. The EPPI-Centre was established in 1993 to address the need for a systematic approach to the organisation and review of evidence-based work on social interventions.

CONCLUSION

In conclusion, will traditional universities survive this onslaught of the competition in the information age? It seems likely that they can survive if they can, or are willing to adapt and change. There are more opportunities opening up for them and more customers from diverse segments of society (corporations, young students who want a campus life, mature part-timers who enjoy the flexibility of online learning and the business partnerships). It seems possible too, that close collaborations between institutions and, perhaps, mergers may be an effective tactic to fight off the competition. It seems to be important how students conceive of their engagement with the learning processes and activities within a technology supported learning context. In order to support students, it is vital that there is a consistent and transparent approach in communicating expectations about a number of issues, for instance, attendance patterns or how to engage in purposeful dialogue in asynchronous discussions.

Quality online learning is not simply a question of putting existing lecture notes onto the Internet. It requires special skills to identify which multimedia method would be the best for delivery of an online course. Should the teacher use a group discussion via videoconferencing or simply accept basic email messages from students and be swamped by emails? Decisions that may only be made with experience and after extensive investment by institutions in staff training.

Online learning has helped to make possible the chance of a higher education to whole new sections of the community, people who want to be in control of their own learning, who previously could not physically get to a university. It is up to governments to make sure that funding is available for all sections of society to avail themselves of the opportunity of online learning. Recent years have seen a dramatic growth in the number of students participating in educational programs on a part-time basis. Factors that have contributed to such growth include, the increasing cost of education, coinciding with the reduced financial aid now available to full-time students. This is coupled with the fact that many students attending universities and colleges today have work and family commitments.

However, this does not mean that everyone will be learning online, just that there is more choice available and the growing number of corporate universities are also meeting a particular need. As has been said before, higher education institutions are a reflection of life and society as a whole and cannot be removed from it. The demands for as much choice as possible in the mass education of the 21st century mean that there are plenty of student customers and universities will survive if they are able to meet their diverse needs. Biggs (2003), describes a level of increasing sophistication in a student's understanding of a subject, through five stages, and it is claimed to be applicable to any subject area. The stages are called the SOLO Taxonomy (Structure of the Observed Learning Outcome). It provides a systematic way of describing how a learner's performance grows in complexity when mastering many tasks. Biggs argues for a general sequence in the growth of the structural complexity of many concepts and skills; that sequence may then be used to identify specific targets or to help assess particular

outcomes. The categories relate to students' level of understanding and ability to work with concepts. Refer to Biggs (2003), pp 38-53 for a full explanation of the taxonomy.

Technological tools can support each stage via flexible delivery, independent study, collaborative activities and formative assessment and feedback. There are fairly clear links not only with Marton and Säljö (1997), on conceptions of learning, but also, in the emphasis on making connections and contextualising, with levels of learning, and even with Bloom's (1956), taxonomy in the cognitive domain.

Much attention has been devoted to new instructional technologies transforming the university environment, perhaps this is due to the extent of the mediums impact. 'Although online education is here to stay, a key question is whether this new form of teaching can offer a quality learning experience', (Marchese, 2000 in Drago et al., 2002). IT appears to be transforming the educational experience, but technological advances are expected to have immediate effect on delivery, price, ease of use, and makes the assumption that this will affect all educational providers.

Whilst the context of this paper is within higher education, many of the issues and attributes are universally transferable to further education and compulsory education sectors. This has been exemplified by a research pilot, (O'Donoghue, 2003). In this study eight schools using a Virtual Learning Environment were investigated. Many of the cultural, staff apathy, content and implementation issues were similar to the HEIs, but the hardware and technical support issues were not. This is due to the limited technical expertise, experience and access which the main stream education sector generally lacks but is assumed within the further and higher education regimes.

Research suggests that education needs to embrace IT and use it to provide high quality, flexible teaching and learning. In order to be competitive the organisational structures need to reflect the environment, and this means a change from the present rigid and inflexible internal/stable structure, to a more fluid flexible type. This implies outsourcing of non-core activities and collaborations with external suppliers. The aim is to reduce costs and improve quality. Findings further suggest that, technological developments could change the role and position of the teacher/ lecturer, (O'Donoghue, Singh, Caswell, 2000).

Staff within our educational establishments are often struggling with the often increased and conflicting demands of teaching, research and administration. If we add the 'e-' to this, then it is hardly surprising that many retreat into their own personal comfort zones, (Oblinger et al., 2001).

One of the major problems faced is that of creating a culture shift in terms of understanding what technology is and what it might achieve in higher education. The shift to focus more on learning outcomes in recent years may make this process less painful, but the development of IT delivery platforms requires academic staff not only to rethink what they deliver (Should I amend that lecture, since students did not appear to understand the argument?), but also how they deliver their content (What kind of activity will enable students to understand the argument?). In the short term, it is likely that IT-based delivery systems will be seen as the most appropriate alternative means of delivering content, if only because of the Internet and the massive spread of IT-based solutions in our lives. A fundamental requirement is to align learning and teaching with media and technology.

If we can then relate this to contemporary models of learning outcomes, (Biggs, 2003) we will potentially have a curriculum which deepens understanding, stretches student's knowledge ability and application, as well as their understanding of possible complex structures.

Whilst the benefits of eLearning are highly prophesised, the many implications of implementing an eLearning programme require careful consideration. Getting it right the first time will ensure long term success in a highly competitive market. Most, if not all the UK university sector are utilising technology to develop what they consider to be eLearning. Many of these implementations are costly and yet superficial, in terms of learner engagement and activity. They provide a content repository and in many cases limited active learner participation. For many students this results in endless reading of screen based text. When staff are 'forced' down the eLearning route as a consequence of management directives and mission statements the creation of sound pedagogic practice is often flawed or missing completely and activities constructed service the technology rather than student or learner, (O'Neill, Singh and O'Donoghue, 2004).

To conclude, this overview paper has attempted to show how the complexity of learning environments needs to follow from a contemplation of the stage of learning to be supported. Added to this, there are cultural, infrastructural and political impediments and considerations which are paramount in any technological intervention or implementation. These will often thwart any real alignment of curriculum with activity based engagement for staff and students. It has then reflected on how technology might support the fundamental motivation to learn, which derives from the need to achieve self-esteem through identifying with a community of practice.

Student expectations of online and Internet access at university is high. This will only become higher as new social software and bookmaking environments continue to rise. Even when they are unsure of what they will be doing online, there is an inherent expectation that the Internet will be an important element to support their studies, their lifestyle and future plans. Increasing access to additional often insidious or subtle support structures (FaceBook, MySpace, YouTube, Flickr) as well as locally contrived environments (ePortfolios, VLEs, MLEs, email, FirstClass conferencing) provide an opportunity for meaningful engagement in a learning process. This may be to access course files, folders, socialise, share and collaborate within teams and group exercises and well as perform personal reinforcing formative exercises. This is all within a multi media scenario – i.e. video, audio, images, as well as text. The delivery is also utilising a range of ubiquitous devices – i.e. PCs, laptops, PDAs, MDAs, phones. Students recognise that their learning is becoming more distributed, and that formal, planned experiences are just one element of their overall experience.

In looking at the very first interactions a novice has with the computer, it does not seem to be the case that providing a clean conceptual model leads automatically to development of the appropriate mental model. This is overlooked or at least simplified in the literature. Learners interpret information very actively and will not necessarily do so as intended; they also tend to activate their own metaphors (regardless of what is provided) to bring new information into their existing knowledge. Such mental models are not expected to be particularly stable and there is a need to examine how existing knowledge interacts with the conceptual model provided in the development and evolution of these mental models.

Twidale et al., (1994), demonstrated in their research that the introduction of technology for use in whole class teaching, can have dramatic effects on the social dynamics of the classroom, and can facilitate role shifts by the tutor, which are notoriously difficult to achieve using other means, (Baranauskas & Weller, 2007). Earlier criticisms about the challenges for stimulating problem solving, investigational work, discussion in group work can be met by technology 'means' and appropriate teaching. If we accept the role of the tutor away from an all knowing expert, towards a facilitator of pupil learning then this role will enable collaborative learning and the ability to develop models for problem solving styles. In light of this learning technology research needs to think outside the box, whilst being systematic and scientific about how this is achieved. As part of this reflection there is also a need to be mindful of the use of research findings and in particular its relevance to policy and practice. We must not forget that learning technology research is a practical and applied discipline which is contextualised in nature.

PROFESSIONAL OUTCOMES AND CONTRIBUTION TO FIELD OF STUDY

This overview has identified the author's published work in the field of technology supported learning and in particular the use of technology in enhancing the student learning process. It has considered some of the barriers to this process – organisational, institutional, pedagogic and technical. As a consequence of his work in the consideration of technology supported learning within education, a national and international profile as an expert within the field has been developed. This includes invitations in the UK and abroad to deliver keynote presentations, a visiting research fellowship in Australia, a invitation to participate in a UNESCO project in Russia, membership of an international reference group, which has a membership of 4. Invited member of the 14-19 DfES research advisory group and the Birmingham LEA action research steering group. This is in addition to acting as a referee, reviewer and member of editorial groups and programme committees within the domain of technology supported learning. In terms of recent research invitations, as well as being active within the University of Central Lancashire, Granada Learning invited the author to evaluate a pilot VLE implementation in selected secondary schools. He also act as an educational consultant to local BBC radio. Personal honours include, the awarding of a Fellowship to the Royal Society for the encouragement of Arts, Manufactures & Commerce for services to education; chair and presidency of the Association for Learning Technology, invitations to participate in research projects centred around learning, teaching and technology.

In today's society, greater demands are being placed on education systems at all levels to produce citizens who can use knowledge in new domains and different situations. Members of society at every level are being asked to demonstrate advanced levels of problem-solving skills to retain their level of employment. Learning to think critically, to find, analyse and synthesise information to solve problems in a variety of contexts and to work effectively in teams are crucial skills for modern employees and thus consistently appear as attributes of the graduate in the prospectus of many universities.

The context and hypothesis of this overview paper is that, used appropriately, technology can enhance, extend, encourage, support and individualise the learning experience. It is not about replacement, although perhaps in some cases an argument may well be made for this. The difficulties lie in defining what 'used appropriately' might infer. To date, significant investment has been made in time, resource and money in creating a repository for what is deemed 'traditionally' delivered learning and teaching materials. The strength of technology use is embedded in not understanding technology, but in understanding learning and teaching and then asking questions of technology, or of technologists, to encapsulate activity based, autonomous, self directed and independent learning regimes.

Many of the difficulties of implementing or embedding technological innovation in learning is in the reluctance or intransigence of the institution to change from what is safe, familiar and comfortable. Consequently virtual learning environments (VLE) are often not active learner centred systems. They are often repositories of PowerPoint lectures.

Despite this the interest is not in promoting the use of eLearning for its own sake, but in improving the student experience by incorporating eLearning effectively into teaching. Although there is some evidence of the e-pedagogies that can support student learning, the literature is complex and at times contradictory and academics often find it overwhelming, (Conole et al., 2004). Hence the use of technology within the context of learning and teaching is fragmented and ill defined.

For many the immediate effects have only helped to increase the competitive environment as universities face the challenge of encouraging the use of technology, it is also argued that technology and the virtual universities will not replace physical universities not least due to the current limitations of the medium. As with much of the technology we use today, computers were introduced into homes, schools and universities without a specific need being identified and because of this became a solution in search of problems, (Weizenbaum et al., in Reffell and Whitworth, 2002) and there are certainly no shortage of problems. Nonetheless technology does have the potential to enhance, excite and extend the learning possibilities within the context of education.

The author interprets enhancement and extension activity as the adoption of student-centred approaches to teaching and learning because of the association with improving student learning; research has shown a correlation between higher quality learning outcomes and deep approaches to learning, Marton and Säljö, 1997) and between a deep approach to learning and a student-focused approach to teaching, (Trigwell et al., 1999)

Thus in conclusion it would appear that there is an apparent conflict of paradigms of technology supported learning. On the one hand technology can enhance and provide student centred activity and engagement. Whilst the contrary argument might be that technology simply provides a repository for resources and has little or limited effect on the organisational infrastructures.

The hype and hysteria militated around eLearning has produced very little in the way of effective and efficient expositions of learner engagement, progress, motivation and assessment. A vast array of anecdotal evidence exists which try to illustrate the value, cost and educational benefit, but this is often convoluted and contradictory. Quality online learning is not simply a question of putting existing lecture notes onto the Internet. Special skills are required to identify what multimedia method would be the best for the delivery of an online course – for example, should the teacher encourage group discussion or could the same be achieved using basic email messages from students? Students themselves are perhaps more aware of the change in learning environments when using learning technologies than their tutors. This is not surprising, the author's research already suggests that learners select approaches because the method fits their personal circumstances and they have the appropriate communication and motivation skills.

What is evident from this overview and the work of the author within his current role in a faculty of health is that work needs to be located around a number of themes:

- The first theme is concerned with the pedagogy of eLearning and, in particular, the development of effective models for implementation, including the application of learning theory to instructional design and use of technologies. Work is needed on the development of guidelines of good practice and support mechanisms to develop the eLearning skills of tutors and students. Another area of research lies in understanding the nature of online communities and different forms of communication and collaboration, as well as exploring different models for online courses.

- The second area focuses on technology, both technical tools and the development of architecture to support different types of learning, as well as standards to ensure interoperability between systems. This includes exploring mechanisms for tracking activity online, exploration of the nature of different types of virtual presence, mobile and smart technology and the development of context sensitive and tailored learning environments.

- The third area is concerned with organisational issues, such as formulating strategies for integrating online courses within institutional structures and the seamless linking of different information processes and systems

Finally, from the author's initial foray into the use of computers in the learning process (1978) to his current involvement in significant technological engagements the one constant is that allowing students to feel involved and to take responsibility for their own learning, (Davies and Smith, 2006; Canaan, 2003) will foster a deeper understanding of concepts and knowledge, and their application.

The technology does not have to be complex or leading edge. It does need to be constructively aligned with the curriculum objectives and learning outcomes so the students can become actively engaged in their learning and the learning and teaching process, rather than passive recipients of knowledge and information. For example the use of a WebQuest (Dodge, 2002), was seen to be a motivating and engaging opportunity for student nurses to consolidate their knowledge and understanding with an independent and yet supported online learning environment, (Drozd & O'Donoghue, 2007), but only because it was aligned to the curriculum aims and objectives.

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APPENDIX 1: *Personal Papers*

Implementing Online Delivery and Learning Support Systems: Issues, Evaluation and Lessons[2]

Jon Bernardes
John O'Donoghue

ABSTRACT

IT is unlikely to create empty institutions delivering distance learning; it is more likely to create distanceless learning which is potentially more accessible to students. This implies the whole business of delivering teaching and learning will be transformed in a way that has not happened for generations. While it is possible to develop IT-based approaches that, to some extent, mirror traditional methods of remote learning by isolated individuals which has little or nothing to do with lifelong experiences or expertise, most academics will find themselves forced to confront very basic questions about what it is that they are trying to achieve and how they might best go about achieving those desired outcomes. This paper considers some of the practical aspects and ways in which, where possible, they have been addressed. The premise of this work is not about technology but the application of technology in a teaching and learning context.

INTRODUCTION

The UK is constantly developing highly funded acronyms which embrace technology within educational initiatives. Translating the acronyms is difficult enough, but trying to further interpret real sustainable outcomes is even more daunting.

Kearsley (1998) writes that "technology is often seen as a quick fix, a siren song" and warns that "educational technology is a distraction ... from what matters most— effective learning and good teaching." The approach taken often seems more in the vein of entertainment than education, with television-type material creating an expectation of how information will be presented; the linkup of the Internet and television through streamed video may just exacerbate this.

How does all this affect us as educators? Will we survive? Will we be at worst systematically "robotised," replaced or dispensable? Will our institutions become empty, desolate buildings or computer server hubs?

It is our view that IT is unlikely to create empty institutions delivering distance learning but, to the contrary, is more likely to create distanceless learning which is actually more accessible to all potential students. What this clearly implies, and what few in the academic professions yet understand properly, are that the whole business of delivering teaching is likely to be transformed in a way that has not happened for generations. While it is possible to develop IT-based approaches that, to some extent, mirror traditional methods of remote learning by isolated individuals which has little or nothing to do with lifelong experiences or expertise, most academics will find themselves forced to confront very basic questions about what it is that they are trying to achieve and how they might best go about achieving those desired outcomes.

Computing technology is often seen as a "big issue" which will generate change, and discussion is carried at a very abstract and "big issue" level. We need to develop a clearer sense of proportion; while IT has certainly changed our lives dramatically in the last few years, there are inevitable limits to the extent and speed of change in higher education. For example, most British higher education institutes simply do not have resources for the kind of investment needed to get broadcast quality materials for every module at every level; this was true in terms of competing with the Open University and it is true today in terms of a thoroughgoing shift to IT-based delivery. More than this, many commentators have now observed that relatively modest gains have been achieved for quite high levels of investment. While there is a place for "big issue" kinds of articles, what follows is very much a "little issues" study of how useful or usable elements of an online delivery platform have proved to be.

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[2] BERNARDES, J., AND O'DONOGHUE, J. (2003). Implementing Online Delivery and Learning Support Systems: Issues, Evaluation and Lessons. In Usability Evaluation of Online Learning Programs. Idea Group Publishing. Book Chapter. ISBN 1-59140-105-4. Pp. 19-39.

What seems certain is that delivery systems are likely to change the role of academics in higher education. Quite what those changes will be depends upon closely observing current developments and exploring what works and what does not work. What follows is an attempt to pick out some of the issues that arise from the attempt to use one particular IT delivery platform (WOLF—Wolverhampton Online Learning Framework) at one institution in one subject area over four semesters.

WOLF exhibits the fundamental components of a virtual learning environment (VLE), in which learners and tutors participate in "online" interactions of various kinds, including online learning, teaching and delivery. It is not the purpose of this paper to debate the viability or appropriateness of which, if any, VLE to implement. The premise of this particular development is more to do with the application of technology within a teaching and learning context.

THE ROLE OF TECHNOLOGY

One of the major problems we face is that of creating a culture shift in terms of understanding what technology is and what it might achieve in higher education. The shift to focus more on learning outcomes in recent years may make this process less painful but the development of IT delivery platforms requires academic staff not only to rethink what they deliver (Should 1 amend that lecture since students did not appear to understand the argument?) but also how they deliver their content (What kind of activity will enable students to understand the argument?). In the short term, it is likely that IT-based delivery systems will be seen as the most appropriate alternative means of delivering content, if only because of the Internet and the massive spread of IT-based solutions in our lives.

Higher education is best seen as a process, focused on learning, in which content is combined in some way with some forms of technology, whether they be "chalk and talk," television broadcast, or an IT-based delivery platform. It is our view that the development of technology-based learning support structures, that is, technology-based enhancements to formal teaching and learning strategies embedded in the pedagogy, will assist the education and training sector best. In some ways, then, the changes currently going on are compelling us to examine issues about how we support student learning, an issue which many of us might prefer to ignore. The most obvious comment, and one heard quite frequently by the authors, from less IT-committed colleagues is "I simply don't have time to change the way 1 do my teaching." Behind this statement perhaps there are also a few staff that do not have time or inclination to critically examine or reflect on what and how they do what they do.

Education is a growing industry, driven by worldwide competition between education establishments and by a rising number of consumers who demand an increased amount of flexibility. To survive in this "brave new world," according to a Curriculum Corporation (1994) report for Australian schools, alternative approaches may have to be taken by the traditional providers. Changes in education caused by transformations in the environment are required. Historically education has been a monopoly business (O'Donoghue, Jentz, Singh, & Molyneux, 2000), but with the technological changes and a changing attitude towards learning, new entrants are threatening to overtake the market.

Research suggests that education needs to embrace IT and use it to provide high quality, flexible teaching and learning. In order to be competitive, the organisational structures need to reflect the environment, and this means a change from the present rigid and inflexible internal/stable structure to a more fluid, flexible type. One of the other driving forces is, of course, the need to reduce costs and improve quality. Findings further suggest that technological developments could change the role and position of the teacher/lecturer (O'Donoghue, Singh, & Dorward, 2001).

Over the recent past some naive attempts have been made to address these issues. The most simplistic solution adopted by some institutions has been to invest heavily in technology. It is actually a relatively painless, one-off capital cost to purchase a lot of hardware to introduce technology, videoconferencing, and large labs of PCs with very powerful software. Significant investment has been made in technology within schools, colleges and universities; this has enabled students to use expensive and powerful networked computers to word process assignments and "surf" the Net! While staff have readily taken up email and to some extent the Internet, their "deeper" adoption of the technology in the context of learning delivery has been limited (O'Donoghue, Singh, Caswell, & Molyneux, 2001).

EXPLORING EVIDENCE

In evaluating a series of pilot modules, a very great deal of material has been generated and the authors are faced with the question of how to present this in some accessible fashion while not imposing too much apparent rationality or coherence to the comments themselves. The main strategy used is to review a conceptual schema from Kolb (1984) and Sulla (1999) and add a third category about the nature of institutional challenges. We then attempt to develop summary conclusions in the shape of key lessons.

The Wolverhampton Online Learning Framework (WOLF) is the current version of several years' development within the university (O'Donoghue, Dalziel, Fleetham, & Molyneux, 2000). The focus of this article is upon usability issues, or more simply, whether deployment of WOLF accomplishes either the intended purposes or indeed any purposes at all. We take seriously the note by Wendy Hall and Su White (2001) of the University of Southampton: "It is rather frightening to think that so much money was spent and we are so little further forward." Rather than focus upon an institutional review, or the views of staff deploying technology, the following draws mainly upon in-class evaluations by students participating in using the technology.

The following material is drawn from qualitative evaluations by students of modules using ICT. Notes are based upon experiences on five level 2 and level 3 sociology modules (around 250 student module registrations) and experiences in collaborating in delivering modules in the subject areas of English, French, philosophy, and religious studies and occasional work in other humanities subject areas as well. This group includes a wide range of different approaches to ICT use; some of these modules were engaging in small "add-on" experiments while others, especially those in sociology, reflected progressive stages of development in using ICT to support learning. In most cases, ICT use was for all students on the module. Points are in no particular order, vary in significance and include positive as well as negative points. It is hoped that simply sharing these points may enable colleagues to avoid the same pitfalls and perhaps benefit from some successful strategies.

THE GOOD NEWS:
## THREE SUCCESSFUL INNOVATIONS

Before proceeding to review the detail, we wish to indicate three particular areas that we believe to be of importance. One of the very common requests made of the authors in training sessions for staff considering taking up the delivery platform revolves around what advantages does the platform provide, either in the sense of what will the platform make it easier or quicker to deliver or in the sense of what can the platform do that conventional classroom teaching cannot do. There are three areas we would wish to pick out to highlight. Each depends on ICT for success and would not be possible without a technology and communications infrastructure.

a) Provision of Streamed Video

Video streaming might appear, at first sight, to be an ideal way to deliver "content"; indeed we intend to undertake some experiments in this area with a delivery of summary lectures. In the first case, interest was in modifying the learning process and developing and delivering something not possible by conventional methods; the chosen area was the evaluation of modules by students.

The provision of streaming video combined with easy-to-use digital video cameras enables staff and students to capture evaluations of the learning process to be repeatedly reviewed at later dates. Students developed "key points" in mid-module and end-of-module evaluations in workshop groups without tutors present; the conclusions were then videoed by students themselves. Since the evaluations were put online within a few days of creation, students could see that their evaluation work has been taken seriously and has been presented as they wished: The edited video clips are presented to the whole class for approval before upload. This also means that subsequent student cohorts can review earlier evaluations. Students were very enthusiastic about this process and many chose to see the tutor involved to report how refreshing they found the openness around module evaluation.

Figure 1: The WOLF screen showing the embedded streamed video
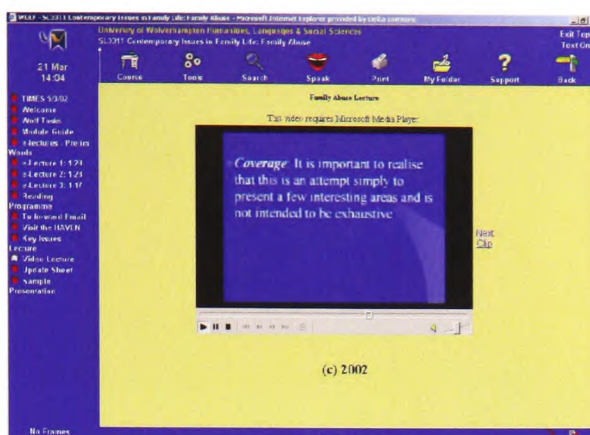
There are, of course, minor challenges to be confronted. Lighting conditions, even with the latest digital video cameras, can be a problem, and students need to be advised to use good lighting. More difficult, in a group situation, is adequately capturing sound; because students handling the cameras tended to use the zoom facility, they were simply too far away from the subject to capture good quality sound. Again, this was a matter of advising students beforehand of the need to be within 1 to 2 m of whomever was speaking.

While of course this form of evaluation needs handling with sensitivity and care, it has proved to be one of the areas that impresses students, colleagues and delegates at conferences, etc. We are sure that the whole business of evaluation is treated in very different ways by different colleagues and that many colleagues would find the inclusion of evaluation somewhat frightening. In the present context, the use of streaming video for module evaluation reflects, we believe, a shift in the learning model and a shift in the power relationship between teacher and learner, a shift we
thoroughly endorse.

b) Extensive Asynchronous Discussions

For many years, the authors have adopted a resource-based approach to learning which avoids a set text or limited number of articles but seeks instead to give students a very rich diet of materials along with the key skills and the relevant intellectual or conceptual frameworks with which to make use of those resources. One common feature of this approach is a particular focus upon the concepts, forms of data and definitions. The authors have been keen to see what kind of new resources can be generated by way of collaborative online learning. We had particular success in generating forum discussions around particular very narrowly defined issues, such as (i) locate a particular definition of family abuse and add this to the forum and (ii) make constructive critical comments on one or more definitions added by other students.

On the negative side, it took some time to find a way of encouraging the majority of students to participate in this exercise; success came with linking the exercise to a small component of assessment. It must also be said that, as is always the case, some students undertook the task in a very mechanical fashion and perhaps did not learn very much. The particular examples yielded hundreds of items on the forum in 3 days.

Figure 2: A typical forum (names blacked out)
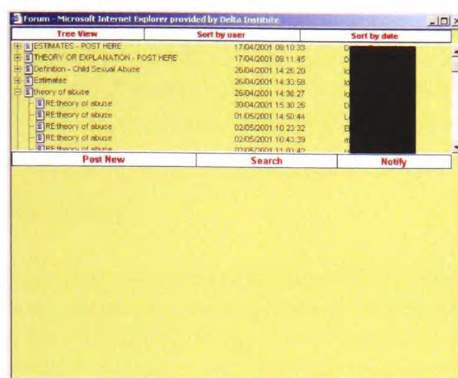
On the positive side, this model generated a wide range of valuable material and some very high-quality critical comments that all students could review. This turned out to be a way in which weaker students could see "what the point was" of particular debates and hence contributed to some quite rapid progress in learning. The feature that seems to be particularly important then is the public and permanent nature of the debate, which would not be possible in conventional techniques. In reviewing end-of-module assessments, it was clear that many students had made use of this forum debate generated several weeks before.

c) Listing of Shared URLs

One of the long-standing challenges for many staff is to get students to "do the reading." With mass teaching it is generally impractical to personally check that the student has done an adequate amount to work; with asynchronous chat rooms and lists of URLs it is actually very easy to check that each individual in a given work group or module has contributed the required number of items; WOLF "tags" contributions with the registered student name. Of course, students vary in the diligence of undertaking tasks and some weaker students may find themselves disadvantaged. One remedy to this is to generate tasks which require students to undertake work of some kind but do not necessarily have outputs that can be qualitatively ranked; one successful approach has been getting students to add relevant URLs to a list. Linking this, again, to a very small element of assessment meant that in excess of 100 generally relevant URLs were gathered by students themselves in a matter of days. One of the benefits of using WOLF to generate the list of shared URLs is that users do not need to master HTML but simply copy a browser address into an input box; the list generated can be also edited easily and quickly.

Of course, very few students could review all of these URLs but it became clear in the final assessment component that many students had reviewed many of URLs, and this seems to have been a much better approach compared to simply asking students to use conventional or specialist subject search engines.

In future, it is intended to use the same facility to get students to submit brief reviews of the material on reading, and we are optimistic that this will improve work undertaken by students in two senses: firstly, more students will actually "do some reading"; and secondly, students will have access to summaries of all of the reading of a given subject area.

Summary

To be clear at this point, the adoption of a virtual learning environment enabled students to achieve three tasks which were of value to their learning and which would not be possible, or so easy, to achieve within conventional classroom situations. The technology under these three achievements is currently reliable, and while digital video may be a little challenging (especially editing), the use of forums and lists of URLs is straightforward.
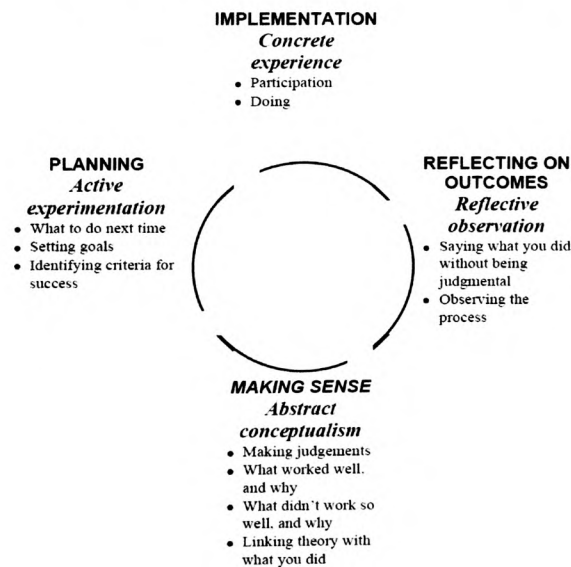
EXPLORING THE LEARNING CYCLE

Kolb's work (1984) on the reflective learner suggests that learning is a social process based on carefully cultivated experience. Within this development structure Kolb shifts the learning away from the exclusivity of the classroom (and its companions, the lecture theatre or laboratory) to the workplace, the family, the carpool, the community, or wherever we gather to work or play or love. The significance for educators is profound because, among other things, it leads us away from the traditional concerns of credit hours and calendar time towards competence, working knowledge, and information truly pertinent to jobs, families and communities. It leads us into "independent" learner-directed learning at a time, place and pace to suit the learner. A prime candidate for flexible-delivery or technology-supported learning environment development.

While the Kolb model is an admirable one, it is important to realise that some colleagues may not adopt such effective methods; this can be seen in the limited use of mid-module and end-of-module evaluations. In institutions under pressure, reflecting on how well or poorly a given class went might be an activity for which tutors simply do not have time. Even if there is time to reflect upon the success of a module, it may not be possible to link activities to "theory" or even consider radical shifts in delivery style.

Among the variety of strategies used to encourage staff to take up a virtual learning environment, one that has been made use of here is the development and dissemination of successful exemplars. This is critically linked to issues of personal investment by staff in learning new technologies and skills; until you can demonstrate to staff that a given technology enables you to do something better, more quickly, or achieve better results, it is unlikely that they will spend a lot of time picking up the technology.

Figure 3: Kolb learning cycle modified to show the process of effective learning (Cox & Pattinson, 2001)

IMPLEMENTATION
Concrete experience
• Participation
• Doing

PLANNING
Active experimentation
• What to do next time
• Setting goals
• Identifying criteria for success

REFLECTING ON OUTCOMES
Reflective observation
• Saying what you did without being judgmental
• Observing the process

MAKING SENSE
Abstract conceptualism
• Making judgements
• What worked well, and why
• What didn't work so well, and why
• Linking theory with what you did

The "Reflective Learner" or "Active Learner" Model?

It is very easy to get carried away with the hyperbole common in discussions about online learning; many of these discussions have at their centre a single model of the learner or the learning process. The most common assumption made is that modern higher education in the United Kingdom has at its heart "active learners" or "reflective learners," that is, individuals committed to high levels of participation and willing and ready to engage in high levels of interaction with other students and staff. It is very easygoing to begin developing flowcharts of the transfer of information (surface knowledge) and means of facilitating or developing understanding (deep knowledge).

One of the things that actual practical experience in teaching in a modern university brings home is the enormous variation and diversity of students, variation of students between different subjects (for example, nursing students are rather different to drama students or business students), and the dynamic and changing nature of the student population (for example, many commentators accept that the levels of paid work that full-time students engage in has risen dramatically over recent years), which is itself dependent upon the history and nature of the institution (those universities with very high levels of participation from lower social economic groups have quite different characters to more traditional institutions). A further important error made across a great deal of literature is to assume that what worked for one member of staff for one set of students in one institution in one subject area is likely to work for other groups of staff and students in other institutions and in other subject areas.

Efforts will be made to identify the disparity between classical models of the learning process and actual experience in a review of student evaluations. Before proceeding, however, it is useful to pick out a couple of important points to make about the nature of the contemporary student body in the particular institution. It is important to bear in mind that these comments relate to an institution with a very large student population drawn, in large part, from socio-economic groups and ethnic minorities which do not traditionally make use of higher education. Many institutions are observing the worrying of a growing "tail" of low achievers; it is tempting to locate the causes for this trend in declining unit resource or poorer teaching delivery. There may however be very different explanations: For example, one of the authors is familiar with students who do not set out to "do their best" nor even to obtain a "good degree," but who make a realistic decision to cope as best they can and try only "to survive." For many students in adverse financial circumstances, there is the inevitable burden of fairly high levels of full-time paid work: At an anecdotal level, one of the authors has surveyed recent level 3 students and found that out of groups of 40 and 60 students only three or four did not have paid work at all. Indeed the majority of students in both groups claim to work full time, at least 35 hours a week, through term time and vacations. In the light of these findings, a certain "drop-off" in attendance and lectures is perhaps not as surprising as it might otherwise be.

In a similar vein, it can be quite revealing to see which areas of technology students make use of. Many academic staff will be familiar with walking into an open-access student computer laboratory and observing that many students are involved in chat rooms and email. One of the surprises in initial experiments in the delivery of online learning was to discover that students were extremely reluctant to make use of discussion forums in which their identity was clear and in which it was known tutors would view their comments. It took some 18 months to devise ways of enabling students to feel comfortable about participating in discussion forums, and one of the key strategies, as used elsewhere, was to link participation to assessment.

IMPLEMENTATION: CONCRETE EXPERIENCE
Training and Preparation

Before anyone can engage in using IT it is important to bear in mind that they are likely to require varying levels of training. Training may need to involve general IT training, Windows-specific IT training, and training specific to the platform—for students, academic staff and support staff.

Embedding Task Orientation

By way of trial and error, it would appear that by far the best means of encouraging adoption by students is class-based "hands–on" workshops with specific tasks. In the present examples, three introductory lectures were delivered online (e-lectures delivering brief pieces of content followed by multiple-choice questions to reinforce the learning), and it was made clear that the rest of the module would make little sense unless these were studied. The first three teaching slots are then used for IT workshops in which students undertake the e-lectures with tutors on hand to help. This not only encourages high levels of participation but ensures that students undertake the necessary training in a very rapid and relatively painless way. It is important to do this work in classroom sessions rather than leaving students to do the work at their leisure to accommodate the very different skill deficits of students from a wide range of backgrounds and previous occupations.

Access: Where and When Chosen

It is plainly important for some students to study off-site, and some of the most enthusiastic are home users. Paradoxically, such students also commented that it helped decrease isolation that they often found when "popping in" for lectures. It is a common mistake for staff to believe that bringing groups of students together is a means of combating isolation in the learning experience. In fact, for some students, being seated amongst students who obviously "know what's going on" can actually be quite intimidating, whereas taking part in asynchronous discussions where students make clear that they are puzzled by particular issues can be quite reassuring. At one point in institutional development debates, dial-up access seemed to be dismissed as less important; from the log files the most intense users are those by dial-up. This may be due to having very old PCs in some labs and/or the readiness of IT-aware students to tackle what other students find intimidating, or the ease of use from a remote location, i.e., no travel. In terms of timing, staff often see learning as progressive, but the usage pattern of e-lectures suggests that some students actually return to the beginning elements when about to complete a module.

Reliability

Like any major piece of software, WOLF has suffered a range of reliability problems—some due to the software, some due to aging hardware in student IT laboratories and some due to the environment (Windows 2000 authentication created havoc). A major improvement in 2001 was achieved by integrating fault reporting into an IT services call centre strategy; this has facilitated the rapid identification of key problems and their speedy resolution.

We have also had to consider the scheduling of delivery of learning. Like many universities, most of our facilities used to close down over the weekend; a range of pressures have been moving us towards weekend and even bank holiday opening for our learning centres. With the inevitability of server crashes it is becoming clear that we also need to have IT support available 24 hours a day, seven days a week.

IT Work Is Time-Consuming

The general student complaint about learning being time-consuming is probably familiar to many who teach in higher education. Early experimental work with IT delivery platforms is almost inevitably additional to the existing work of a module rather than a straightforward replacement of tasks. The comment about excessive time is also pertinent to the staff members tasked with the creation of new ICT-based learning experiences. The senior management team all too often regard the use of technology as a cost-effective and time-saving attribute. This is not the case, however; certainly when materials and resources are developed well, the relationship of input to output is daunting (Conole & Oliver, 1998). When added to difficulties around training and access to computing technology, this can mean that IT is seen by students and staff as simply increasing the workload, at least in terms of time commitments.

Hopefully, as development work proceeds and staff become more confident to abandon or delete some of the conventional methods, the issue around time might be reversed. Again, once one feels more comfortable with the technology, it is possible to develop some exercises which students themselves find highly rewarding and judge to be a good investment time; for examples, see the three successes above.

Figure 4: Some samples of e-lectures
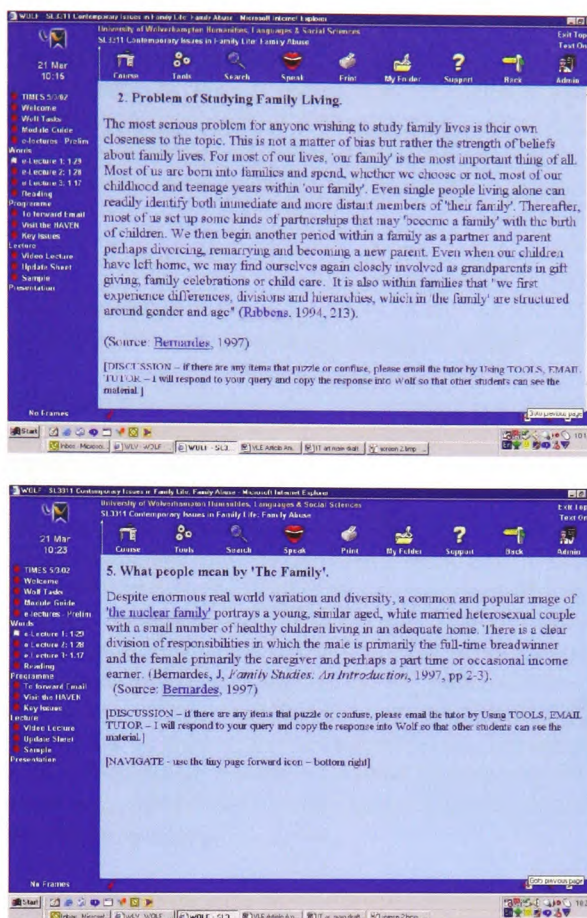
REFLECTING ON OUTCOMES:
REFLECTIVE OBSERVATION
Detailed and Careful Module Evaluation

There is a need for close continuous evaluation (this in itself modifies the learning cycle), integration and adaptation of approaches to learning. We make extensive use of module evaluations undertaken by students to enable us to reflect upon the way in which IT delivery systems change the learning cycle.

These evaluations had three elements: firstly, without tutors present, students made video recordings reporting good features, bad features and suggested changes; using the same formula, student groups developed reports (usually of half a page or a page length) for a plenary class discussion; and these reports are then reviewed in plenary sessions, and the module tutor reviews all points made in an attempt to get further detail. One small but important point about those plenary discussions is that the tutor goes to great lengths not to be negative about any point made or at all defensive but rather accepts comments made at face value and seeks clarification as necessary.

Technical Issues

It is no accident that some of the more enthusiastic staff around IT delivery are technically able. One thing that technically able staff can do is recognise a technical problem and give students some explanation (even if it is not very helpful). For example, evaluations revealed an issue around the "reliability of URLs": This relates to copying details from browser address windows into WOLF when Web sites were initially located using Jeeves and similar sites that do not point to the real address but cache a version of the page in the host site. For some colleagues experimenting with WOLF, the fact that some URLs would work and others did not was a cause of immense frustration.

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Steepness of the Learning Curve

While you can achieve a great deal in a short time with careful "step-by-step" instructions, this does not solve all problems. WOLF permits students to create word processor files and then upload these for tutor marking. This generated some complaints: Many students had real problems opening a Word window, saving the file, then using the browse button in WOLF to upload files; the level of assumed skill and understanding is actually quite high. This kind of problem led to more intensive training in the early weeks of modules and moves to request software development to make such processes easier for students to manage.

MAKING SENSE:
ABSTRACT CONCEPTUALISATION
Integration of a VLE Into Coherent Teaching and Learning Strategies

A high level of teaching enthusiasm is a key to success: With a committed member of staff, students are likely to see WOLF as relevant; where WOLF is an "add-on" supported by an "outside" member of staff, generating students' enthusiasm is more challenging. Hence, simply instructing staff to adopt technology is not a good idea; staff need to be encouraged to rethink their teaching and assessment and adopt technology-supported learning strategies rather than see a VLE as an "addon." One of the other points about the usability of IT which has become clear to the authors is the way in which it is an enormous mistake to regard IT as an additional or add-on component of a conventional course. It is, of course, very tempting to put a "toe in the water" by experiments with just one element of an online delivery system. Indeed, one of the authors is a learning fellow and had little choice but to commence staff development in this way; it does however have an enormous drawback in that the staff are not compelled to critically reexamine and remodel their teaching strategies until some considerable time after commencing to use online delivery. In a wider sense, it is important to place oneself in the position of the student so that any use of IT is likely to be seen to be beneficial in some way, either by reducing effort, or by improving assessment performance for the same given effort, or perhaps by enabling students to access sets of resources that they could not otherwise access.

In this case study, technology-supported learning is central to the teaching and learning strategy: In class, a data projector is used to deliver PowerPoint for lectures, to access WOLF itself, and to reference Web sites and other applications; outside class, WOLF and email are important.

Comprehensiveness Seems To Be Important

WOLF aims to be able to deliver anything needed for teaching and learning, such as direct access to our Learning Centre Online Public Access Catalogue, email directories, etc. The need for such comprehensiveness was brought home when, at one point, embedded email was not working: At this point, email traffic for the module was limited. Once embedded email was working, the ease of emailing tutors with a few clicks meant that use rose significantly.

Supporting, Enhancing and Extending Communication

Better communication between students and staff, and between students is seen as important in evaluations. In a modern university, there is a tacit acceptance that staff are often "busy" when students may be available; email and asynchronous contacts are identified as important by students.

PLANNING: ACTIVE EXPERIMENTATION
Danger of Overenthusiasm

In early stages, there was a temptation to load a lot of passive content into WOLF and expect students to be pleased by this—in some ways, using WOLF may create more work for students than, say, photocopying handouts. Few students responded to such passive content so tasks were developed which began to give online work an assessment weighting

Customisation

Having an in-house VLE means that we can and do respond to what students and tutors report and develop the platform accordingly—2001 has seen the beginning of work on a variety of functionality requests to adapt the VLE to the needs of colleagues across a range of disciplines with very different pedagogical practices. We have also begun work on customising a "special needs" version to be rather more friendly to a range of special needs in terms of visual disability and accepting different input devices.

Costs and Benefits

Like most VLEs, WOLF does not offer immediate savings in terms of staff investment. At least a dozen workshops have been run with staff where one question always emerges: How much more time will adopting WOLF take up? Invariably the response is that WOLF at least doubles module preparation time and may triple this for first-time use. It remains to be seen over the longer term whether this extra effort is balanced by benefits. For students, similar judgements are often made: A few students refused point-blank to use WOLF at all because they did not judge it to be worthwhile. Happily, most such students are "converted" when fellow students report the ease of access or the location of useful material. On the more positive side, the majority of students often view the use of IT, in itself, as a "good thing" and as signalling a concern to be "up-to-date" and "add value" to teaching. More and more students have seen whiteboards and Internet sites used in secondary school environments and expect such systems as undergraduates. On the downside, students rapidly spot the transfer of costs from the university to students, e.g., cost of Internet connections, costs of PCs and costs of printing.

One other thing that has to be grasped by higher education institutions is that the transition to virtual learning environments is far from "cost neutral." The first level here is the issue of the purchase or development of the delivery system itself. Secondly, there is the development of the infrastructure so that the delivery system can actually be used. We have faced some major issues here in terms of the provision of staff computing and student computing. Thirdly there is the issue of training staff to the point where they feel able to experiment in the use of the delivery system. Fourthly, and probably most importantly, there is the enormous cost of transferring a module from conventional teaching methods to some mix of conventional and IT-based teaching methods. Plainly in an institution facing financial difficulties, this kind of increase in staff costing is not supportable without significant additional investment. Fifth, however, there is a wide range of incidental costs involving the exploitation of new technologies. For example, one of the authors of this article has had to develop skills and expertise around HTML, digital video recording, digital video editing, file manipulation, and a range of other areas. Most of these areas have also represented one-off or capital costs in some way: for example, the purchase of software, hardware and training.

MODELS OF INFUSION

As tutors and students respond to the challenge to utilise computer technology in the teaching and learning process, they must be mindful of an important distinction between using technology and infusing technology. The context of this is based on some research work carried out by Nancy Sulla (1999), who draws a distinct difference between the embedding of technology naturally as another resource and the using of technology as some ethereal overlay.

"Technology provides opportunities never before available to humankind, yet school, college and university departments are in danger of sabotaging—through incomplete and, in some cases, detrimental implementation plans—the power of technology to transform the teaching and learning process. Three popular trends regarding technology use threaten to impede the transformational impact of technology on the instructional environment."

Education establishments are investing large sums of money toward outfitting rooms with computers with the assumption that computer technology will somehow enhance the educational experience. Education and its practitioners and administrators should be considering the consequences on teaching, learning and infrastructure that the utilisation of technology will have. Gosling (1981) makes some major assertions towards technology use within an educational environment, some of which have materialised, but these are largely based on the use rather than enthuse model of interaction.

The first trend is an overemphasis on merely building tutors' and students' technology skills (Sulla, 1999).

There is not only the overemphasis on technology skills, but there is the much more serious preceding problem of persuading staff and students to invest in developing skills. One of the authors is the teaching and learning fellow responsible for IT in a School of Humanities, Languages and Social Sciences. Actually persuading staff to attend training sessions in the first place has been challenging. Once you have people in a training session, persuading them that a given piece of IT is useful is a second challenge. Thirdly, and much more importantly, encouraging staff to take ownership and responsibility for the development of IT involves a quite marked culture shift; staff are used to having IT technician support to do the work for them and find it a bit of a shock to discover that the university expects staff to generate material, edited where necessary, download files, and test the files.

The second trend is the belief that tutors' inability to use technology can somehow be overcome by the students' ability in this area (Sulla, 1999).

One of the reasons for resisting the adoption of technological solutions is the fear of making plain one's own incompetence before a group which may include highly skilled students. There is actually a much more serious problem here; it is a serious mistake to believe that students have uniform levels of expertise and skill. Some students will have high-level IT skills, some will have adequate levels of skill, but some may have a positive phobia of technology. This introduces yet more complexity in the delivery of IT solutions in that take-up will vary significantly; those for whom take-up is low may actually be quite difficult to spot because a host of other "excuses" or "reasons" may be given as to why they have not made use of technology for a particular exercise.

This dangerous belief leads to a third problematic trend. Computer use is often seen as an end unto itself (Sulla, 1999).

On the one hand, adopting technological solutions does signal to students some level of concern and investment by the institution, and a fair amount of module evaluations have been positive because of the effort put into the modules. On the other hand, it is important to get very clear that there are some things that cannot be done by way of IT; in advertising a pilot level 3 module with online delivery to current level 2 students, the author was quite surprised to find students approaching him and asking not, as he had expected, How many classes do we not have to turn up for? but rather "Will there be opportunities for meetings?" It became clear that students valued face-to-face interaction both with tutors and with fellow students.

INSTITUTIONAL CHALLENGES
New Organisational Structures

One of the major problems that many institutions have faced is how exactly to bring about the implementation of IT-based learning.

While there is a common belief in modern universities that management skills are universal, it may well be that management of IT projects require not only IT skills but also participation in the project itself. This was neatly illustrated in our case by a lengthy misunderstanding about the usability of the delivery platform. Staff using WOLF for teaching found that some elements simply did not work and reported this to their representatives on the management committee; at the committee level, the representative of the software developers reported that the complaints were a result of misunderstanding and staff ignorance rather than software failure. The management committee itself, because few members actually used the development platform, was incapable of verifying either story. Those using the software, after some months of making complaints, simply adapted the way in which they used the software to avoid problematic areas and the problem appeared to have been resolved. The final solution was to turn the error reports into a management issue about the quality of managing software performance.

Models of Encouraging Staff Take-Up

At a range of conferences, a very common statement from delegates is that the real problem is persuading colleagues to take up this or that technology or learning strategy. One model in some institutions is the idea of a separately funded (and usually quite expensive) courseware development unit; while this may generate attractive online content, one of the problems is the "distance" generated between the tutor and students by way of the intrusion of courseware developers who might suggest this or that particular idea because it's feasible and might reject other ideas because they are not technologically possible. In another model where funds are too tight to permit this kind of development, reliance has been placed instead upon the development of exemplars, and arranging ad hoc training sessions, and simply trying to encourage individual members of staff to "give it a go." Given that, in all honesty, it has to be said that adopting a virtual learning environment does involve a lot more work at least in the first instance; it is not exactly encouraging for staff when they are given no extra recognition or teaching time allowances for transferring to a virtual learning environment.

It is important to bear in mind that while some colleagues may enthusiastically embrace technology and be willing to change their relationship with students, other colleagues might find this all very threatening and intimidating. It has to be said that some staff go to quite considerable lengths to develop and maintain a particular style of authority and control and find the whole idea of surrendering some elements of control simply unacceptable.

New Learning Methods

One faces a real dilemma when trying to introduce changes in teaching and learning in that there is an inevitable and sensible conservatism on the part of most staff; at the very best, staff want incremental, controllable change.

What this means in practice is that they wish to "dip their toe" in the IT water and experiment with minor changes on existing modules. Paradoxically this actually inhibits the development of new learning methods because the changes made, using IT, are used to support conventional traditional techniques rather than used to rethink approaches to learning methods.

New Delivery Methods

One of the problems facing most British higher education institutes is that of the currency of the IT infrastructure. In developing the modules from which the modular evaluations are drawn for this article, one of the authors has faced two sets of problems. Firstly, it turns out that the delivery system required a particular version of a particular browser which, in turn, required a given level of CPU performance and memory. A good demonstration of the distance between enthusiastic IT staff and their not so enthusiastic colleagues is that it was not until staff familiarisation sessions that we discovered that most of the staff PCs simply could not run the browser! Secondly, the delivery system includes the facility to deliver streamed video and audio; like many universities, our student PC labs are not sound enabled. One immediate solution was to learn the joys of video editing to provide a rolling credit style summary of what was being said.

New Partnerships and Collaborations

In terms of the delivery of humanities, languages and social sciences there are only limited opportunities for collaborations outside the university. However, it has been interesting to observe how "struggling with the technology" has actually generated a range of new partnerships and collaborations across disciplines within one school and across several different schools. For example one of the authors is now working with staff from Schools of Nursing and Midwifery and Computing and Information Technology in developing a "special needs" version of the delivery platform.

The challenge is to develop a curriculum which can emphasise interconnections between learning pathways, and the practical application of knowledge in a variety of contexts and flexible relationships between core and specialist knowledge. It must be based on sound pedagogy. The focus on students and tutors needs to be not only on the training but also on the facilitation of central processes of learning,

which is too often interpreted as something which is transmitted to people rather than an activity for which they themselves have responsibility and ownership.

CONCLUSIONS AND KEY LESSONS

What are the lessons here for eLearning and the use of a VLE to support students in an interactive way?

Use eLearning programmes to support and enrich action within the social group.

Don't allow it to become an alienating or isolating experience.

Ensure that eLearning programmes allow maximum flexibility because people bring their whole past history with them when they engage with learning.

Ensure that learners can engage with the programme by adopting communication strategies appropriate to their needs.

Ensure that learners do engage by providing an explicit set of goals with which the learner can identify emotionally, i.e., be aroused and motivated.

Establish ongoing exemplars to demonstrate to staff that students will positively evaluate and welcome the adoption of IT. Use these exemplars to demonstrate to staff that IT enables you to achieve things that cannot be achieved in conventional settings, for example, asynchronous discussion of conceptual material, public dissemination of evaluations by streamed audio and video, and the provision of organised, expensive lists of URLs.

Get the technological infrastructure right! It is important that everybody has access to appropriate technology. One of the attractive things in much IT is to demonstrate "gee whiz" technology—this often demands the most powerful processor, graphics capability, or audio. This is a doomed exercise if the student PC labs are not up to the job and even more pointless if the home PCs owned by students cannot cope either.

Integrate the IT-based learning investment in staff appraisal and staff hours calculation.

Provide extensive support networks. At the University of Wolverhampton, there is an informal support network outside of formal committee structures; while this meets infrequently, it does provide a forum where issues "not on the agenda" can be discussed openly. In most institutions, there tend to be situations where it is not "wise" to criticise a particular individual or his or her pet project; this can lead to situations where simple technological failures are just not acknowledged.

While technology inevitably changes the role of teacher or lecturer, it also needs to be recognised that the adoption of technology may also change the role and dynamic of management and management structures.

Clearly the development of the WOLF VLE will need to be incorporated into the wider institution information system, i.e., a managed learning environment (MLE). This will enable the integration of student records and finance into the learning system. MLE includes the whole range of information systems and processes of the college, university or institution (including its VLE if it has one) that contribute directly or indirectly to learning and learning management (Learning and Skills Development Agency, 2001).

Finally, and in other words, use technology to avoid the major drawbacks of the "one size fits all" didactic approach of traditional teaching methods.

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The use of a WebQuest to support undergraduate nurses[3]

Mary Drozd
John O'Donoghue

KEYWORDS:

Abstract

This study considered the implementation and evaluation of a simple technology-supported learning (TSL) solution to support independent learning for undergraduate nurses. Initially, a review of the literature pertaining to TSL, particularly the integration in the form of a WebQuest for undergraduate nurses, was undertaken. Based on this, a WebQuest was designed, implemented, and evaluated. To evaluate it from the students' perspective, we formulated and distributed a questionnaire to a cohort of 11 students. From the analysis, it was deduced that the students who completed the WebQuest were positive about using it. Positive comments included "enjoyed the flexibility" and "good way of working." Overall, the WebQuest provided a different way of learning for students. The "blended" approach enabled key concepts to be explored and reinforced using alternative, perhaps less didactic delivery methods. Blended learning is currently promoted to provide more flexible learning opportunities in the context of widening participation (Department for Education and Skills, 2004). However, the integration of more explicit links with previous and subsequent activities in the module is needed to ensure alignment with learning outcomes. The sample of students was limited in this pilot study. The project enabled staff to consider a low-level technological intervention as an enhancement to student and learner engagement.

Introduction

A WebQuest is a guided, interactive exploration of a topic where some of the information is found on the Internet (Dodge, 1995) Hill, Wiley, Nelson, and Man (2004) suggest that it is an effective strategy to promote exploratory learning. As a solution was needed for undergraduate nurses to learn more independently, a WebQuest was introduced into a module. The students involved in the WebQuest also participated in its evaluation. It was believed that promoting inquiry-based learning via a WebQuest could lead to more active and deep learning (Biggs, 2003). Bates (1995) highlights that the choice of technology should be driven by the needs of the learners and the work context, not by its novelty. However, the context and profile of students suggested an inherent limited information communication and technology (ICT) skill set; hence, this novelty factor was difficult to avoid, and the exposure to a new scenario was difficult to assimilate for a number of students. The innovative nature of the WebQuest potentially skews the interest and motivation of both the staff and students—this is most widely recognized in the form of the "Hawthorne"[1] effect. The novelty of the activities and engagement is one aspect that brings the "Hawthorne" effect into play, but this effect also means that people are likely to be more interested now than they will be for more traditional teaching. In general, the increase in motivation felt by the participants was not due to the novelty but due to the content, engagement, and activity.

A WebQuest was developed as an additional dimension to the module and to the students' learning experience (McKimm, Jollie, & Cantillon, 2003); the face-to-face sessions continued. The use of a WebQuest has the potential to extend the students' learning beyond the classroom (Brown Yoder, 1999) and, therefore, address the issues raised above. Moreover, a WebQuest can allow both students and teachers to be creative and productive, using the powerful medium of the Internet to spark the imagination, solve problems, and promote discussion about important issues (Brown Yoder, 1999).

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[1] The "Hawthorne" effect was named after a Western electric plant where studies were carried out in the 1930s. In these studies, it was found that workers who were given experimental conditions of work usually perform their work at a higher level, even if such conditions, such as dimming the lights, were detrimental.

WebQuests are based on the ideas of inquiry, constructivism, and cooperative and collaborative learning (Dodge, 1995). These are key skills for undergraduates to develop. Previously, the students were requested to do background reading prior to a taught face-to-face session on "falls and osteoporosis." It was anticipated that this replacement strategy would enhance the students' motivation and engagement with the task and, hence, engender a deeper learning. This relates to Bloom's (1956) higher levels of cognitive behaviour.

The literature suggests that technology-supported learning (TSL) can complement the taught sessions that students receive (Laurillard, 1997; O'Toole & Absalom, 2003). The term "blended learning" has been adopted widely to describe combinations of face-to-face and technology-based learning (Stubbs, Martin, & Endlar, 2006). The technology can allow the students to work at their own pace and at a time that is suitable to them (Carpenter Piercey, 2004; Motteram, 2006). All these are taken into a context of alignment where both learning and teaching focus on engaging the students in meaningful activity.

Planning and delivery

A WebQuest template was created, followed by the building blocks described by Dodge (1995). However, developing the task and producing the necessary resources took much longer than originally anticipated. The short-term WebQuest was designed to optimize both the students' and the tutor's time.

The WebQuest was launched during a taught session in the second week of the module. This was to address any potential or unforeseen problems with its use. The Web-Quest was for use at an individual level rather than as a collaborative learning experience and was to be completed over a 1-week period.

Evaluation

A short questionnaire was developed and given to each student the week after the launch of the WebQuest. The response rate was 100%. There were 11 students (82% were female and 18% were male) in total, of whom 7 (64%) completed the WebQuest.

Reasons that were stated for not completing the WebQuest included "could not locate it" and "couldn't get past the first screen."

Unfortunately, some students had difficulty accessing the WebQuest due to late enrolment and registry issues (18%). Other reasons for not completing it were related to technological difficulties and perceived limited ICT skills (18%). For example, one student commented of not knowing how to move from one screen to another.

The comments from the seven students who completed the WebQuest were positive and included the following: "references at hand," "reinforced my understanding," "allows private time at home... can go back to it at my leisure," "all the information was there... good links to other sites," "easy to locate," and "good way of working."

Chickering and Ehrmann (1996) set out seven principles of good practice for the use of technology, which, if followed, could encourage students to use deep approaches to learning:

1. Encourages contacts between students and faculty,
2. Develops reciprocity and cooperation among students,
3. Uses active learning techniques,
4. Gives prompt feedback,
5. Emphasizes time on task,
6. Communicates high expectations, and
7. Respects diverse talents and ways of learning.

The WebQuest was evaluated against these seven principles of good practice

The amount of time required on the tasks in the WebQuest was not indicated or requested. Although the students did not comment on this directly, one student mentioned leaving the task and going back to it later. On reflection, a rough time guide would have been helpful for the students' planning purposes. In addition, a deadline for completion should be incorporated. As it was a formative assessment, timely feedback to the students needs further consideration (Chickering & Ehrmann, 1996).

A peer review by a colleague of the WebQuest prior to implementation identified issues such as readability and appropriate content. Alongside this, a pilot study involving a few students provided invaluable information on how long the WebQuest took to complete, whether the links worked, and whether the task was engaging (Dodge, 2002).

Analysis

March (1998) warns that the most important factor related to student learning and technology use is how teachers relate the technology-based activity to other learning activities. The WebQuest was not linked to previous activities but did link to subsequent activities some weeks later. Clearly, this may have resulted in the WebQuest being viewed as an isolated experience disconnected from the rest of the curriculum and, therefore, not constructively aligned (Biggs, 2003). Chickering and Ehrmann (1996) believe that active learning is an essential ingredient for good practice with TSL. The WebQuest aimed to promote active learning, and as 64% of the students completed the WebQuest and articulated that it positively helped them progress, then even for such a small cohort, it would seem that they were actively engaged with the task.

Although students did have the tutor's contact information as a resource for help and advice, this was not accessed. Possible reasons for opting not to access this include the following: that it was not explicit enough, that perhaps the students did not feel that it was a realistic option, or that the importance of undertaking the WebQuest was not accentuated enough. Although Jairath and Stair (2004) highlight that technological support is vital in developing these resources, the authors would argue that the students also need access to this support.

A face-to-face launch of the WebQuest with students was seen as vital to highlight salient issues. Help needed with ICT skills or conceptual understanding can then be addressed. Some students did not feel that they had adequate ICT skills to undertake the task. Moreover, it was not established whether all students had access to a computer and to the Internet outside the university. The timing of the launch is also important. If students are not able to access the technology due to enrolment problems at the start of a module, then they are disadvantaged. In addition, there has to be constructive alignment with the module. The WebQuest appeared as an isolated event for some of the students. Stronger links to the module's learning outcomes and to the previous or subsequent activities are needed.

The WebQuest could be used more collaboratively with students rather than undertaken individually. Indeed, the students can take on various roles within the WebQuest to augment their learning. Clearly, learning was facilitated for some students by the intervention of information technology. Factors influencing this include student motivation, learning style, level of anxiety, learning skills, approach to learning, and previous knowledge (Shaw & Marlow, 1999).

A limitation of this TSL is the time-intensive nature of designing a WebQuest. However, once it is developed, it can be used many times thereafter. Time needs to be invested to ensure that resources are current and that the links are working for future use. There is an inherent requirement for some intensive ICT-associated skills to create and promote eLearning; this cannot be a reasonable expectation of all teaching staff. However, students entering higher education will increasingly expect blended approaches to learning. Many students will already be accustomed to virtual learning environments. Furthermore, the numbers of students entering higher education and the limited teaching resources might make blended learning a realistic option in the future (Department for Education and Skills, 2004). Student expectations are varied. Increasingly, students will be entering higher education with ICT skills, and TSL can lead to active engagement and facilitation of learning.

It was a formative assessment, and therefore, a tracking system with a feedback facility would have been useful to see where and what difficulties arose. Moreover, Ramsden (2003) suggests that the introduction of a new learning task must be accompanied by adequate attention to assessment because this highlights the importance of the task to students and motivates their activity. This might have increased the uptake of the WebQuest as the number of students seeking tutorial support increased. Furthermore, it is necessary to encourage contact between students and faculty when using TSL (Chickering & Ehrmann, 1996; Jairath & Stair, 2004).

Carpenter Piercey (2004) suggests that WebQuests require learners to be creative and use high-level problem-solving skills. This might have been too challenging for some students at the beginning of this course of study. However, Chickering and Ehrmann (1996) believe that good practice communicates high expectations. Indeed, the creation of a community of learners through student-to student discourse can help develop higher forms of reasoning (Anderson et al., 2001, cited in Twomey, 2004). Davies and Graff (2005) would concur with this and believe that online discussion can promote student-centred learning. As the WebQuest was undertaken individually, this element was missing but needs serious consideration for inclusion. Chickering and Ehrmann agree that learning is enhanced when it is more like a team effort rather than a solo race. Furthermore, a lack of close interaction between learners may have adverse consequences, possibly because learners experience feelings of isolation. Haythornthwaite, Kazmer, Robbins, and Shoemaker (2000) found out, in their study, that the students who failed to make online connections with other students reported feeling isolated and more stressed than those who made such connections.

Kerres and de Witt (2003) offer a 3C conceptual framework that encourages blended learning designers to consider the content of learning materials, the communication between learners and teachers and between learners and their peers, and the construction of the learners' sense of place and direction within the activities that denote the learning landscape. In addition to this, the Salmon (2000) progression could have facilitated the implementation of the WebQuest. Prior to the launch of the WebQuest, the students might have benefited from simple tasks to perform in a virtual learning environment. However, McKimm et al. (2003) believe that one of the main barriers to the effective use of teaching materials is the technology itself rather than the design of the learning materials themselves. In addition to this, the learners' needs and experience must be taken into account.

Learning was seen to be supported through technology via the WebQuest. Most students participated and reported positively about their experience within the TSL. Moreover, the students who participated valued the experience and were positive about completing it. Clearly, the WebQuest is not an endpoint but the beginning of the students' use of the web for learning. The WebQuest could be an integrated part of the curriculum with clear links to previous and subsequent activities (March, 1998).

Conclusion

A WebQuest has the potential to enhance the learning of students if used appropriately. It can encourage more independent and active learning and can be an efficient means of delivering course materials (McKimm et al., 2003). However, the emphasis must be on sound pedagogical design rather than on the technology itself (Downing, 2001). The planning and delivery phases of TSL are crucial stages. Trench (2001) warns that the technology should not transform teachers into technical trainers but should help teachers to create teaching and learning environments, to mediate between knowledge and the students, and to become open and critical professionals (Cowan, 1998; Schon, 1987). Clearly, simple substitution of face-to-face teaching for technology-based learning is unlikely to be successful because there is also a need to integrate communication channels to reinforce progress toward intended learning outcomes (Laurillard, 1997; O'Toole & Absalom, 2003).

The incorporation of collaborative learning and peer support, particularly for remote students, would be a feature in future WebQuests. Furthermore, systems need to be in place to help students with limited ICT skills. Cotton and Gresty (2006) warn that advances in technology will not automatically lead to learning enhancement. Hence, due regard must be made to the appropriateness of context, content, and the technology. The evaluation of a WebQuest should be related to the impact on learning rather than to the use of the technology itself. Clearly, there needs to be evidence of effectiveness when adopting TSL. Systems need to be in place to help and support students with limited ICT skills.

Further investigation needs to be considered in evaluating the student experience. McKenzie (1998) advocates the importance of using a variety of methods to triangulate outcomes and avoid the distortions evident in any single form of evaluation used in isolation. For example, details on student learning need to be sought, as well as student reactions to the TSL. Indeed, students, teachers, and other stakeholders should be included in the evaluation to obtain a holistic view (McKenzie, 1998).

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Rural Broadnet and The Electronic Village Hall[4]

Len Graham
John O'Donoghue

SOME TERMS:

- Broadband: means high capacity link between locations, such as fibre-optic cable, which facilitates fast transmission of information, sound, images.
- Online: properly used means linked to a network of computers, or to another remote location, via a technology based network.
- ICT: Information Communications Technology.
- CBL: Computer Based Learning.
- IT: Information Technology.
- C&IT: Computing and Information Technology.

INTRODUCTION

Rural Broadnet, a University of Wolverhampton rural information technology project, was established in order to address and overcome the problems of isolation and poor public transport which limit access to further and higher education in rural areas. Working with local communities, groups and agencies, the project helped to establish a number of rural ICT resource centres and to facilitate the delivery of a range of education courses for local people. The work of Rural Broadnet also became involved with rural economic regeneration through contacts with small and medium sized enterprises and self-employed people for whom training and education needs could be met through local and flexible delivery.

LOCALITY AND THE PROJECT

Wolverhampton borders, to the west, south and north, considerable expanses of rural countryside. The chosen area of operation, Shropshire, is a large county which stretches west to the border with Wales, it was within this westerly border area, the Marches, that the project focussed its work. Shropshire is predominantly rural and much of the south and west is rolling hill country. The population spread in the south west is at half the national average density and is amongst the lowest population density in the Country. Population decline, evident over much of this century has more recently reversed so that there is now a net increase in population in rural areas but with incomers including a significant proportion of middle aged, middle class resource importers and leavers including the young and the unskilled. Local authority boundary changes have meant that the Wolverhampton University campus in Telford, originally a Shropshire campus, is now located in the separate local authority of Telford and Wrekin. There are FE colleges in Telford and the four widely spread Shropshire market towns, Oswestry, Bridgnorth, Ludlow and Shrewsbury.

The impact of social, economic and technological change, the consequent process of long-term agricultural decline, allied to the major food crises of recent decades such as salmonella and BSE, and followed by reform of the Common Agricultural Policy, has created the most severe problems for farmers operating in marginal areas such as the Marches. Much local employment was agriculture related and most companies were at the lower end of the small or medium sized enterprises' scale with the majority being sole traders. The 1996 Wolverhampton Business School Study[i] of local business in the area indicated low skill levels, including IT, among the local work force and low participation rates in training. Figures for 1997, from Shropshire Chamber's Household Survey[ii], showed a 10% drop in numbers trained within the Shropshire workforce and also indicated that less than half the workforce in Shropshire consider themselves well qualified in IT. There were generally low participation rates in 16+ education and a high level of out migration of the 16+ age group. Agricultural decline had meant that Shropshire now qualified for European Union 5b status, which offered grants for economic regeneration, in the border areas but economic development initiatives had to compete with superior funding available close by in Wales.

Rural Broadnet was project funded by the Higher Education Funding Council for four years from 1995 to 1999 under the widening participation programme with a mandate to provide non-award bearing courses. Its objectives included the establishment of two electronic village halls within its first year and the facilitation of education and training delivery to local rural areas. The brief was to utilise information technology to overcome the barriers, particularly of distance and isolation, faced by rural communities in accessing education, training and associated advice, guidance and information.

Target groups included women returners, older people, the 16-25 age group, those on low incomes and small businesses, particularly farming, with little tradition of in-service training. Methodology drew both from community development and andragogy. From the former, great emphasis was laid on locally identified needs, active local self-help and the establishment of working partnerships between local communities and other agencies. From the latter, were taken the ideas of Malcolm Knowles[iii] that adult learners can, with support, identify their own learning needs and can become motivated and self-directed. It was also recognised that adult learners throughout their lives have an increasing need to undertake learning episodes, continuing professional development, particularly where these contribute to current life and career needs.

In addition to the target groups and the project's continuing education focus, it became clear that issues of economic regeneration would need to be addressed. They were from any perspective integral to the learning needs of local communities and to their continued vitality and viability. As the crisis in agriculture deepened through the late 90's, economic regeneration became an even more pressing issue. Government and local regeneration agencies increasingly identified the significance of information technology for economic regeneration and the potential of telematics for 'e-business' applications in rural areas. Therefore information technology was clearly identified as an important education and training need for local businesses and communities. Additionally, it was recognised that failure to address low skills in I.T. would lead to further economic decline and to a widening of the gap between the technological 'haves' and 'have-nots'.

WHEN, WHERE, HOW, WHY ?

The importance of economic regeneration was immediately emphasised in the first phase of the project which entailed working with local communities to plan and organise the development of the two electronic village halls, which would be local IT Centres with training and education functions. The two centres were to develop very different but in each case local representatives identified economic regeneration as a primary need and objective.

The Vron IT Centre was situated in the newly built Community Centre at Newcastle-on-Clun, a hamlet of 133 people remotely located near the Welsh border, which is a centre for surrounding settlements. In addition to the Community Centre it also has a primary school, post office, church and pub, and three buses per week to different destinations, but none of them to the nearest community education provider. The Community Centre was built to replace a run-down village hall and local people decided to include an IT Centre in order to increase work opportunities by providing local IT training and by creating a Teleworking Enterprise. The Community Centre houses a pre-school Children's Centre, a meeting hall, youth room, bar & social area and is used by many local groups.

Arising from the teleworking proposal, local training needs were immediately identified and Rural Broadnet was requested to facilitate basic IT and teleworking training for a small group of workers. The Vron IT Centre was equipped with five networked Pentium computers and a printer, provided on loan and installed by Wolverhampton University. An Internet connection via a modem was installed, but upgraded to ISDN2 communications in order to facilitate training. The Vron Centre ran in its first year entirely on volunteer support but from the second year secured funding to employ staff to manage the Centre. The Community Centre has a Management Committee of local people.

The Bishops Castle IT Resource Centre was developed by the local Rural Challenge regeneration programme with support from South Shropshire District Council and other local agencies. Housed in a large converted factory, it also comprised offices for local agencies and businesses and six small business workshops. The function of the Centre was to provide IT access for the local community and also to provide IT support to the businesses housed within the project and to small and medium sized enterprises within the rural area, with the aim of supporting economic regeneration. Staffing of two full-time and two part-time posts includes the Manager and Caretaker who have responsibilities for another project. Bishop's Castle is a small market town close to the Welsh border with a population of 1569. It serves as a local centre for a large, sparsely populated and hilly rural hinterland, the town's facilities are used by some 9000 people. The IT Centre has 10 Pentium computers, networked with server and printers. There are also colour and black photocopiers, scanner, two Internet connections, with ISDN2 communications, fax and other minor equipment. The Management Committee consists of representatives from the local Council and other local agencies.

THE ACTIVITY

Both IT Centres function so that computers may be booked on a drop-in or hire basis. Both run a range of training courses from introductory courses for non-users through to courses on specific software programmes or targeted at specific groups such as women and business groups. The bulk of their other training has been conducted through traditional pedagogy, using face-to-face tutors, with a small amount of self-directed work supported by paper packs, disks or CD programmes. In the opening phase of their development, Rural Broadnet gave direct support to the training of staff and users within the Centres. A priority was to bring users into the Centres. Those members of the community with no IT skills were targeted and training groups were rapidly filled with enthusiastic students. Rural Broadnet also identified and supplied suitable CD and paper based learning materials for 'drop-in' learners.

Recent surveys had indicated a low level of training activity within local small businesses and trainers working in south Shropshire suggested local farmers were particularly unresponsive to training programmes. However, with word-of-mouth publicity and announcements in church, the opening of the Vron IT Centre, in August 1996, was a spectacular success with 400 people attending. After the opening, farmers' evenings and other similar events, with demonstrations of IT software and hardware, were well attended and training and other services taken up. Almost all courses have been fully subscribed at Newcastle. The high level of response from local people, women and farmers included, would seem to relate directly to the social role of the Community Centre as the focus of local networks. The Community Centre, and its affiliated organisations, are run by local people, many of whom are farmers or farmers' wives. The Community Centre being at the heart of the local community has meant the IT Centre is on home territory and the local community feels a sense of ownership. The regular programme of events and activities at the Centre has meant that cross fertilisation arises, resulting in greater use of the IT Centre.

In its early years, the Centre experienced difficulties because the promised funding for management staff did not materialise and the strains on the volunteer managers of the full-time programme were considerable. There were also cashflow problems which put the Centre in jeopardy. However, funding for management was obtained during year 2 and good progress towards the establishment of a viable teleworking operation, set up as a community based charitable company, has now been made. The Centre staff are also supplying useful low cost consultancy services to local people, including small businesses. The development of teleworking, however, threatened to have an inhibiting effect upon the training function of the Centre, by limiting the Centres use for training to evenings. This problem has more recently been alleviated by obtaining additional space for the training function.

Bishops Castle IT Centre has been increasingly successful in the face of some initially negative dynamics in its planning and early development phase. Some aspects of the Rural Challenge Programme were controversial and this resulted in a change of management. It was felt that several local groups had a strong prior claim to the IT facility, these included the local secondary 'community' school and a local Trust with strong IT skills. Whilst being both popular and successful, there was felt to be a long-standing threat to the local 11-18 years community school as a result of its relatively small size, given the current cost and efficiency criteria for schools. The opening of the Centre, managed by Rural Broadnet, was consequently low key but early skills training sessions recruited well and the Centre was well received by the local community.

The role of the Centre was to offer access to IT equipment, education and training and support to businesses as well as community. Its economic regeneration role was a major aspect of its work in a town that had lost jobs and industries over recent years. The IT Centre formed part of the larger Enterprise House project which also offered small business units for new companies and office accommodation. The Bishop's Castle IT Centre was a new institution, not part of local social networks, and it was therefore necessary to create an identity for it and to find ways of bringing in the wider community. It was a new Centre dealing in new technology and it needed to create new traditions, new patterns of usage. When the Centre opened, community groups were invited to make visits and those people with absolutely no computer experience were targeted for induction courses and training groups easily filled. The Centre ran an effective publicity campaign and set up family evenings to gain a wider exposure to the local community. Early training and family sessions were provided free of charge and they recruited very well.

Since opening in December 1996, work with business has been targeted as a complimentary way of working in relation to the local school which had an established programme of community education.. A range of introductory courses for small business have been successful and a parallel business support scheme is in place. Of registered users, 25% were self-employed matching the number of sole-traders registered in the area. Evidence indicated that the self-employed had higher levels of qualification than the average, and also that they worked longer hours and thus had less time available for training. It seemed clear that the local and flexible provision of courses was essential in order to enable this group to take up education or training opportunities. As the Centre has become more established, it has increasingly fulfilled a much needed low-cost IT consultancy role for small businesses in the surrounding area, thus generating valuable income and helping the progression towards long-term financial viability.

In 1999, following lengthy discussions with the County Council, plans have been agreed to move the local Public Library into a section of the Enterprise House building not previously refurbished since its use as a factory. The considerable synergy between the developing services of the Library and the IT Resource Centre, in terms of books, texts, research information, public information systems, education and training makes for a particularly exciting development. Footfall, particularly for the IT Centre, should increase significantly.

In Rural Broadnet's latter stages, it has facilitated, at these and other centres, supported distance delivery of courses using off-line and online computer technology. These courses include the Cambridge Information Technology Certificate, an NVQ level 2 in Childcare, both in collaboration with a further education provider and a voluntary sector project, and also HE short courses dealing with the Internet, web page design and some programming languages, from the University's School of Computing and Information Technology. Educational guidance and information services have been delivered via Career Focus and project staff. The Wolverhampton University HE Shop delivers advice and guidance services into the area via video-conferencing and the intention is to integrate these and other guidance services more fully into the delivery programme. The development of Rural Broadnet's planned programme also involved facilitating supported distance learning through additional centres, including schools and an FE College, currently there is a total of seven delivery venues.

The first HE short course selected by Rural Broadnet, from the School of Computing (SCIT), was the 'Welcome to the Internet' course, which had been originally prepared for use by the Broadnet project whose focus was work with Black Country companies. Broadnet was a broadband project, with high capacity dedicated ICT links which permitted fast access to the Internet and to multi-media materials. Unfortunately, it was not possible to access such material in rural areas where Internet connections were slow and equipment generally was not of the highest specification. . Rural Broadnet therefore decided to take a 'bottom-up' view of technical development for use within these centres, and adapted freely available, low cost, tried and tested solutions that were viable for rural areas. Thus the online approach was rejected as being too expensive for rural areas to run. The alternative was CD based materials with paper back-up, on the assumption that rural ICT centres could afford to install a good 'entry level' computer with CD drive. CD has the advantage of being able to hold large amounts of information and also allows the student to work directly on computer from the CD based courseware. Online connections were utilised for submission and return of assignments. In collaboration with SCIT staff, the course Internet was rewritten for CD, piloted, revised and then launched as part of a very successful ESF 5b programme.

Voluntary sector collaboration

The development of links with other IT centres led Rural Broadnet into working relationships with secondary schools in the north of the County, and also collaboration with the voluntary sector. Traditionally, the voluntary sector is a Cinderella sector, often poorly equipped and without access to appropriate training. Oswestry and District Helpmates had undertaken a training needs and skills analysis in its local area and, with Rural Broadnet's support, then embarked on developing a training programme. The idea of locally delivered, ICT supported distance delivery appealed to Helpmates since many of its staff and volunteers had difficulty accessing traditional day-time provision and were likely to benefit from more flexible delivery. Courses in IT and Childcare NVQ level 2 and also Assessor Training, were arranged and facilitated in the Oswestry area using a local secondary school as delivery venue. Local mentors were recruited and trained by Helpmates to provide support for the Childcare course and proved effective in supporting students who were studying in a more individualised and dispersed way than with the IT courses.

Rural Broadnet has also collaborated with Oswestry and District Helpmates to establish an ICT training resource within the Helpmates project to improve flexibility of access to training facilities for students. Other discussions have explored the possibility of future collaboration to develop customised digital courseware to meet specific local training needs.

SUCCESS AND FAILURE

As far as this project is concerned, the key to success in attracting rural students back into education has been the fact that courses have been available locally and have been delivered flexibly. Students have frequently emphasised the importance to them of the local opportunity to study. Young mothers, carers and small business people point out the difficulties they have in finding time to study and they have welcomed the flexibility offered by a choice of evening or daytime study sessions at a local centre. They have also welcomed a regime which can accommodate gaps in study and allows for students to complete courses at their own pace.

Small businesses have used the training not only to develop IT skills but also to apply the skills in order to improve their business systems. The Internet and Web Page design course has enabled some businesses to market their services to a much wider group of clients. In other cases the Web Page design course has proved a key in helping to identify new Internet related business development opportunities as part of an economic diversification process. From the HE short course, Rural Broadnet has established a collection of student web pages, over 70 of which are for small businesses. The businesses include bed and breakfast, craft manufacture and sales, food based companies, a film services company and retail outlets such as book shops. New Internet based businesses include a roasted meat company specialising in spit-roasts, and diversification projects into Internet publishing of children's books, tractor and spare parts sales and home furnishings.

Collaboration with voluntary sector organisations has meant their networks of contacts have facilitated recruitment of students. Voluntary sector organisations have welcomed the flexibility of ICT supported training and have pointed out, anecdotally, that some students who had negative schooling experience had actually reported a preference for the relative 'privacy' of computer based learning where they felt they could risk 'failure' and not feel exposed before a group of peers.

The use of local mentors and support staff, particularly for the childcare course organised by Helpmates, proved highly successful in supporting students who were working in a non-synchronous group on an individual basis. In this case, the support extended by the mentors and NVQ Assessors helped keep the group of students motivated and confident that they would succeed.

The most obvious failure in the project was, perhaps not surprisingly to those experienced in ICT, in relation to dealing with technical problems. In the early days, technical hitches with software and hardware caused some dislocation to the work of the centres. In the later stages, as networks, ISDN connections and Internet routing became more common, there were problems with these new elements of the technology. Technical support for Rural Broadnet was originally provided from the nearest university campus, 80 kilometres away. It became increasingly apparent that, with the best will in the world, busy technicians were not able to drop whatever they were doing in order to solve a problem in a rural centre over an hour away by car. Where an IT system was not functioning, then a centre might grind to a complete halt and its students be frustrated. With IT there are no half measures, it either works or it does not work.

The solution to the problem was, by virtue of having attracted additional funding for our education and training work, to appoint a sufficiently skilled technician who would have dedicated time to support Rural Broadnet's needs. This underlined the need for ICT based projects to build into their staffing the appropriate technical skills. ICT based projects need to be realistically planned and costed, and adequate technical support services have to be included in the budget.

Video-conferencing also proved more difficult to apply to Rural Broadnet's work than originally anticipated. The initial intention had been to experiment with the use of video-conferencing as a regular communications tool, to video-conference lectures to rural areas, to provide remote tutor support and to video-conference advice sessions. In the event, Rural Broadnet was successful in setting up HE advice and guidance sessions to a local school from the University's HE shop. University policy on purchasing decisions and technical problems such as compatibility of different systems also held back progress. It also became clear, from the experience of other universities, that the medium was proving less flexible than many had anticipated. In some cases, the video-conferencing systems had proved too cumbersome for students to use regularly, in other cases, where it had been used in an ambitious manner to link a tutor with a group of students, or to link two groups of students, the medium proved too inflexible to maintain adequate communication.

The lesson from these experiences appeared to be that where the transaction is simple, for example an advice session 'head to head' with two individuals sitting and static in front of a camera, then the medium had a good chance of success, as in advice and guidance. With groups, however, problems arose about who was in camera shot, or who was in microphone range. It was clear that video-conferenced meetings needed to be very carefully structured if they were not to become confused, and worked best in expensive 'studio' settings. Being very structured might, of course, detract from the vitality of the meeting experience. It was also realised that the video conferencing system would require exclusive access to a centre's ISDN line and thus prohibit concurrent use of the line for other purposes, such as email and Internet access. Despite these reservations, it is anticipated that, as the technology evolves, video-conferencing will become increasingly used in rural ICT learning systems and particularly the Internet conferencing options, such as NetMeeting, will facilitate provision of remote tutor support.

CONCLUSIONS AND PROSPECTS

Methodology for learning via ICT
The basic assumption of Rural Broadnet's work has been that, in order to offer a wider range of FE and HE courses in rural areas where students may study in small and therefore 'uneconomic' groups, or indeed individually, it is necessary to find a delivery methodology that does not rely on frequent face-to-face, i.e. 'in the flesh', tutor contact. The supported distance delivery method therefore assumes that courseware materials will be locally delivered, with local support staff or mentors, but without the face-to-face presence of a tutor at each session.

The provision of local 'face-to-face' support is, of course, a key issue for students who return to learning. Rural Broadnet has provided such support via mentors, NVQ Assessors and through its own outreach workers. Local mentors may provide personal and pastoral support, and in some cases a degree of academic support, to students. As far as ICT courses are concerned, Rural Broadnet's outreach workers, though not tutors, are knowledgeable in relation to ICT and are therefore able to offer support to students in the local centres. As the curriculum expands and becomes increasingly wide and specialised, it is unlikely to be possible, however, to find suitable academic skills available from local mentors within the community. Whilst developing the services of local mentor support, it will be necessary to address the issue of facilitating remote access to active tutor support across a wider range of study areas, making online tutor links more interactive. It will also be necessary to offer student support through well designed courseware and integrated support materials. These may include devices such as 'frequently asked questions', through links to supplementary study materials which offer additional explanation of particular topics or greater detail and via multiple choice tests which can help students assess the progress of their on-going learning. However, synchronous virtual study groups will also require ready access to tutorial advice via an audio and visual link, which includes the ability to share, in an interactive mode, the computer desktop so that both students work and tutor's explanation may be readily accessed by student and tutor.

As far as an increase in the range of curriculum material is concerned, it is important to recognise that not all subject areas are equally susceptible to CBL and some areas may prove unsuitable, for example some types of technical or scientific subjects which may require practical laboratory or workshop sessions, or management subjects which require applied learning in a practical management context, are difficult to replicate through distance delivery because of the need for a degree of collaborative interaction. Other areas of 'people-skills', which require human group interaction to facilitate learning are also likely to prove less susceptible to delivery via ICT

In the case of field courses, the multi-media resources of information technology have been deployed with some success to simulate the practical experience of these courses. However there is a continuing debate on how far simulations can replace exposure to the actual experience of the field course.

Student centred learning via ICT

Many 'continuing educators' assume that an emphasis on ICT supported learning methodology is necessarily in conflict with a 'learner centred' approach to continuing education. However there is a strong case for suggesting that ICT as a learning vehicle increases the range and quality of learning resources available to individual learners and offers an enhanced 'learner centred' approach. . Salmon[iv] discusses the learner centred approach, influenced by Carl Rogers, adopted by the Open University Business School which 'has been concerned from the beginning to adopt broadly constructivist methods in tutoring and to avoid transmission views of management teaching. It puts the student firmly in the frame as an active meaning maker who comes to the learning on the course with an existing store of knowledge.' The information resources of the Internet, the design capabilities of computer aided design systems, music making programmes and numerous other facilities offer individual students the possibility of self-directed, individualised learning programmes which allow them to research topics or explore their chosen fields of learning to advanced levels. As Sulla[v] argues in relation to ICT based learning in secondary education:

'If we consider the wider picture of education, computer technology provides students and teachers with unprecedented opportunities to transform the teaching and learning process, from the most common and simple uses to the most sophisticated. Word processing eliminates endless hand copying and allows teachers and students to place a greater emphasis on content revision. Graphing software eliminates hand-drawing of equation results and allows teachers and students to focus on the effects of various changes in an equation. The Internet greatly reduces the time and effort it used to take to locate information on a topic, and puts students and teachers in touch with other students and teachers around the world, as well as with content experts. Simulation software enables students to participate in experiences otherwise unavailable in school. With all this vast potential at their fingertips, the challenge to educators today is not to use computers, but to infuse computer use into the instructional setting. A two-part approach of problem-based learning and facilitation does much to promote technology infusion.'

If continuing education does not embrace the opportunities offered by ICT based learning, then it risks losing touch with mainstream development and depriving its student cohorts of wider learning opportunities Smart et al[vi] describes the changes in mainstream HE:

'Students are becoming much more demanding and responsive in terms of technology use. Best practice recognises that conventional lectures are relatively ineffective in terms of providing an opportunity for learning....... Accordingly lecturers are increasingly deploying student-centred activities in lectures that encourage the students to reflect on the lecture content. Computers can and should be used to provide multimedia illustrations of concepts........ including images, diagrams, animations, video and sound. While all these media can be delivered individually without a computer, current presentation software also allows them to be integrated into a single presentation.'

An ICT based approach requires investment in new learning resources and a change in methodology for the tutor. In practice, one of the greatest obstacles to the introduction of ICT supported learning is the resistance of teaching staff. Littlejohn and Stefani[vii] have described one of the barriers as the skills gap:

> 'One of these perceived barriers can be articulated simply as the 'skills gap', which exists for both staff and students with respect to effective use of C&IT. At a deeper level this particular barrier can be expressed in terms of many academic staff showing a lack of understanding of their pedagogical role in a C&IT-based instructional environment. This interpretation is based on comments from many staff who display a reluctance to adopt teaching strategies that are different from those which they themselves experienced and a difficulty in acknowledging a theoretical underpinning of teaching and learning strategies.'

For the successful delivery of ICT based learning, staff will need professional development in the use of the technology and the provision of online support to students. Salmon[viii], has analysed the role of the 'moderator' in relation to online learning and has highlighted key principles. These include 'housekeeping' aspects which relate to the practice of online support and facilitation, including continuity issues such as visiting the Web based materials often, ensuring continuity of virtual conferences, the need for good layout and easy navigation of virtual materials and the need to facilitate emergence of new topics and deletion of redundant materials to maintain momentum but avoid overload. These are all skills which have their parallels in traditional methodology. Salmon emphasises the need for thorough training in all aspects of online work for staff and students before such work is undertaken.

Government policy on ICT and learning

The movement of Government policy in the direction of embracing ICT to enhance learning at all levels within the mainstream education system has spawned a number of initiatives. The National Grid for Learning (NGfL), University for Industry (UfI) and the e-University lead clearly in this direction. Lifelong Learning Partnerships are being encouraged to recognise the potential of CBL. Initiatives such as the Higher Education Reach Out to Business and the Community Fund (HEROBaC) are also broadening the focus of University work and have much to gain from ICT based solutions, for example in work based learning and communications links. The Capital Modernisation Fund and Adult and Community Learning Fund are providing support for the development of local ICT centres as community learning resources. This level of government support for ICT initiatives is to be welcomed and offers support to the HE sector and also to community based ICT centres.

Governments are attracted by the 'big idea' which they believe may have a transforming effect upon education, and certainly NGfL and UfI have the potential to effect such transformations. However, there are dangers in such 'top down', broad brush approaches where ICT is concerned. ICT implementation is a detailed and precise process and planning for implementation requires an absolute knowledge of what the technology can do if there is to be ultimate success. In practice, both NGfL and UfI have experienced difficulties with implementation. With NGfL the rate of progress within individual schools appears to be conditioned either by the quality and level of support from the local authority or, if local authority support is poor, by the level of ICT skills available within the particular school. Where neither is available schools have struggled to deal with the complexities of network technology and to devise systems for using the potential of ICT based learning. With UfI, basic misunderstandings about the lack of suitability of the Internet as a medium for transmitting a mass learning system have surfaced from within the project and widespread concern has been voiced from participating agencies during the preparation phase of the project. With both schemes, there appears to have been a lack of sufficient prior consideration of the educational and technical methodology required to make the systems work satisfactorily. Both NGfL and UfI are likely, however, in the medium and longer term, to become increasingly influential in the methodology of mainstream education, offering new opportunities and enhancing the scale and scope of the learning experience and as such they are developments which should be applauded and whose significance for rural areas should be carefully evaluated.

Sustainability, diversification, community development and andragogy

Over the life of the project, diversification has been increasingly identified as a key response to the issue of sustainability both for rural ICT centres as well as for the rural economy generally, particularly farm related businesses. For the latter, the recent crises in the agricultural economy, already described, have brought an increasing number of rural businesses to the point where they are no longer viable, particularly in marginal farming areas such as the Marches. In order to sustain these businesses, owners have looked to develop second or third income streams by diversifying into new commercial developments. The role of economic regeneration in rural areas over this time has included helping to sustain existing companies by enabling them to diversify into other activities.

Diversification has also become an important principle for the rural ICT centres. Rural Broadnet initially opted to work with these community based centres, rather than with traditional adult and community education centres, as a response to locally identified needs for the development of these centres. In practice, they have offered more flexible learning opportunities for local people than local schools tend to offer, especially where day-time access is essential. However, lacking the wider resources of schools or colleges, they have needed to develop solid income streams to become sustainable. Through diversification they have extended the range of their activities and have added, to their normal training programmes, corporate training, advice and consultancy on a full range of ICT topics. This broader range of activities has enabled both centres to move positively towards financial sustainability.

The original community development emphasis of the project has, through the economic regeneration work, become a major element in Rural Broadnet's activities. Community development in the developed world has focussed primarily on issues of urban deprivation, where programmes have addressed improvements in quality of life, social and support facilities, with some emphasis on training and, more rarely, on community industry and creation of jobs. The third world, indeed colonial, origins of community development in the 1940's tended to deal with economic development, education and primary healthcare issues and were often based in rural areas where communities were stable but impoverished. Rural Broadnet's activity has been closer to this original model in providing support to the rural community through economic regeneration. The project has responded to the 'felt needs' of local communities, through partnerships with local schools, colleges and funding agencies, to provide relevant IT skills for rural areas.

It can be argued that the introduction of these ICT centres, their facilities and training programmes has contributed to the empowerment of local people and local communities. Access to IT and Internet skills impacts on a number of levels: it can provide new and wider training opportunities, improve career prospects, enhance SME performance and stimulate new business development. It can help to address the deficit of the IT 'have-nots', the rural disadvantaged and the older generation, who were not schooled in IT. More generally it helps to overcome some of the disadvantages of rural isolation by providing a cheap and fast communications medium for sending and receiving an immense range of information, documents, designs and other data. Acquisition of key skills in IT offers empowering opportunities in terms of information and knowledge for people in rural areas.

Future prospects

The development of ICT based learning may well, in the longer term, prove to be as significant for adult learners as the introduction of the Open University. Certainly it has all the potential to make a major step change in rural education and training through the spread of ICT learning networks into rural areas and the broadening range of curriculum materials capable of remote delivery. Thus rural learners, whether for 'returner' courses, mainstream degree courses or shorter continuing professional development programmes, have an increasing choice of learning options.

ICT has the potential to impact in a major way on the wider needs of rural areas by providing a vital and influential communications medium offering unique facilities reaching into the economic and social lives of rural dwellers. Already it has facilitated the development of ICT based rural enterprises that offer new opportunities to sustain the rural economy. It also offers important opportunities for re-vitalising rural facilities and service provision for increased empowerment of rural communities, allowing them more control over their lives and a greater level of self-determination in decision making. Whilst the needs of the IT 'have-nots' are yet to be fully addressed, rural widening participation funding offers the possibility of doing so.

Were these ICT developments not taking place, then the prospects for rural areas would be poor indeed. The questions for rural continuing educators are how far they recognise the significance of ICT based learning, and how far they are prepared, or able, to utilise the technology to benefit their rural learners. This is not simply a question of delivering courses via ICT, indeed that may be only a part of the final picture, it is a matter of ensuring that appropriate IT skills are in place for staff and students, of providing networks of support, including local mentors and ICT remote tutor support, for a wider curriculum, and of facilitating access to the hardware and software which can enable learners to be self-directed in research, learning and communications. With appropriate advice and guidance, ICT based education and information systems offer continuing educators the prospect of radically enhanced provision for rural learners in the twenty-first century.

Notes

i.   University of Wolverhampton Business School. (1995). 'Bishop's Castle and District Rural Challenge Business Survey' University of Wolverhampton.

ii.   Shropshire Chamber of Commerce, Training & Enterprise. (1997) Household Survey.

iii. Knowles, M. (1990) 'The Adult Learner' Gulf Publishing Company.

iv.   Salmon, G. (1998). Developing learning through effective online moderation in Active Learning 9, Oxford University, December.

v.   Sulla, N. (2001) Technology: To Use or Infuse. Technology Source. http://horizon.unc.edu/TS/commentary/1999-02.asp. Accessed January, 2001.

vi.   Smart, C., Miller, P., Essaka, M., Young, C., and Wonnacott, D. (2000). Producing computer-based presentations for the lecture theatre or the Web. CTI Centre for History, Archaeology & Art History. University of Glasgow.

vii. Littlejohn, A.H., and Stefani, L.J. (1999). Effective use of communication and information technology: Bridging the Skills Gap. Association for Learning Technology Journal Volume 7.2, 66-76.

viii. Salmon, G. (1998). Developing learning through effective online moderation in Active Learning 9, Oxford University, December.

Learnwise Learning Platform Research Pilot
Creating the future "Integrated Digital Curriculum"
FINAL REPORT[5]
November 2003

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Learnwise Research Pilot
Creating the future "Integrated Digital Curriculum"

PURPOSE OF THE REPORT

Within the next five years the use of ICT is expected to become routine in virtually every classroom; schools will be able to run their administrative systems electronically and integrate them with curriculum networks; and all communications between schools and Government will become electronic. The National ICT Research Centre for Education aims to investigate and evaluate the factors at work in the successful implementation of such an ICT application often referred to as a Virtual Learning Environment (VLE) and in particular focus on the Granada Learnwise[1] product within schools and to investigate the ways in which the factors above influence the nature and extent of any successful implementation.

The function of this document is to describe the implementation, development, and consequential impact on learning and teaching when introducing the Learnwise VLE in schools. To quote from Patrick Hazelwood's address to the Opening Minds Conference[2]

'When a revolution in ICT holds a promise of almost unlimited horizons, the National Curriculum continues to force schools into a straitjacket of conformity. The opportunities for learners to develop a love of learning, an understanding of preferred learning styles and to 'think outside the box' have, at best, not been encouraged and, at worst, have been squashed.'

Learnwise provides an opportunity for schools to 'think outside the box'; to consider the content, its delivery and engagement within the context of an educational process both in and out of the school context.

[1] Learnwise is a family of eLearning products produced by Granada Learning.
[2] Hazelwood, P. (2000). Tunnel Vision. Conference Presentation. Opening Minds Conference. Royal Society of Arts.

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[5] O'DONOGHUE, J. (2003). Creating the future 'Integrated Digital Curriculum'. Learnwise Learning Platform Research Pilot, commissioned by Granada Learning.

BACKGROUND

The participating schools were:

- Ivybridge Community College. Ivybridge, Devon
- Carmel RC Technology College. Darlington, Co. Durham
- Sawtry Community College. Huntingdon, Cambridge
- Ballyclare High School. Ballyclare, Co. Antrim
- Outwood Grange. Outwood Grange, Wakefield
- Park View Community School. Chester-le-Street, Co. Durham
- Broughton Hall High School Technology College. West Derby, Liverpool
- The King John School. Benfleet, Essex

DEFINITION

The Joint Information Systems Committee (JISC), although it focuses on the FE and HE sectors, gives a useful definition of what a Virtual Learning Environment (VLE) might be considered as:

'Virtual Learning Environment refers to the components in which learners and tutors participate in online interactions of various kinds, including online learning'[3]

A Virtual Learning Environment (VLE) in the context of compulsory education is a content independent software solution which provides a coherent and consistent interface between teacher developed content[4] and invariably the individual learner or group of learners. This can be local classroom based material or remotely accessed resources, for both teachers and students. A 'good' VLE will support 'good' teaching and learning, it will not replace it. A VLE will provide added value and enhance the existing provision by making available a set of services with sound pedagogic aims and objectives, which explore and exploit teaching and learning activity. The benefit of utilising a VLE is that the classroom boundary is extended, not physically, but metaphorically, in the sense that students can continue and access their 'classroom' outside the traditional domain – library, clubs, home etc. via the Internet, Intranet and also via off-line developed activities.

INTRODUCTION

Concerned educators, such as Fullan[5], (1995) and Stenhouse[6], (1980), have long been troubled by the vast differences among individual students, both in the abilities they bring to the learning environment, and in the way they move through a learning programme. Many educators believe the more individualised the teaching, the greater the learning. Based on the premise that better learning occurs if we teach an individual to achieve to the extent of their own ability at their own pace, technology and a VLE could play an important role by enabling each student to progress through a program tailored to their interests, abilities, and learning rate. Such a program gives the student a greater role in the educational process. Through learning options and a continuing process of self-assessment, the student is encouraged to become a self-directed and self-initiating learner[7]

VLE's are learning management software systems that combine the functionality of a variety of computer-mediated software - e-mail, bulletin boards, newsgroups and online methods of delivering course materials, as well as an opportunity to participate in activities with such resources.

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[3] Joint Information Systems Committee. http://www.jisc.ac.uk/ . Accessed August 2003.
[4] This can be individually designed, developed and imported or via teacher group developments or via 'professional' content development services.
[5] Fullan, M., and Hargreaves, A. (Eds.). (1995). Teacher Development and Educational Change. London. The Falmer Press.
[6] Stenhouse, L. (1980). Curriculum Research and Development in Action. London. Heinemann.
[7] O'Donoghue, J., Jentz, A., Singh, G., and Molyneux, S. (2000). IT Developments and Changes in Customer Demand in Higher Education. Asynchronous Learning Networks (ALN), Volume 4, Issue 1 - October. ISSN 1092-7131.

The diagram opposite is based on the one circulated widely in Autumn 1999 by BECTa[8]. Its main purpose is to position the VLE as part of a much wider school information system which includes administration, finance, student records etc. to form a Managed Learning Environment (MLE). In the short timescale afforded to this pilot this natural extension was not a consideration, but from the School perspective is a major issue if the student data is not to be replicated between systems. Most VLE's are intended not simply to reproduce the classroom environment -'online', but to use the technology to provide learners with new tools to facilitate their learning. They aim to accommodate a wider range of learning styles and goals, to encourage collaborative and resource-based learning and to allow greater sharing and reuse of resources[9].
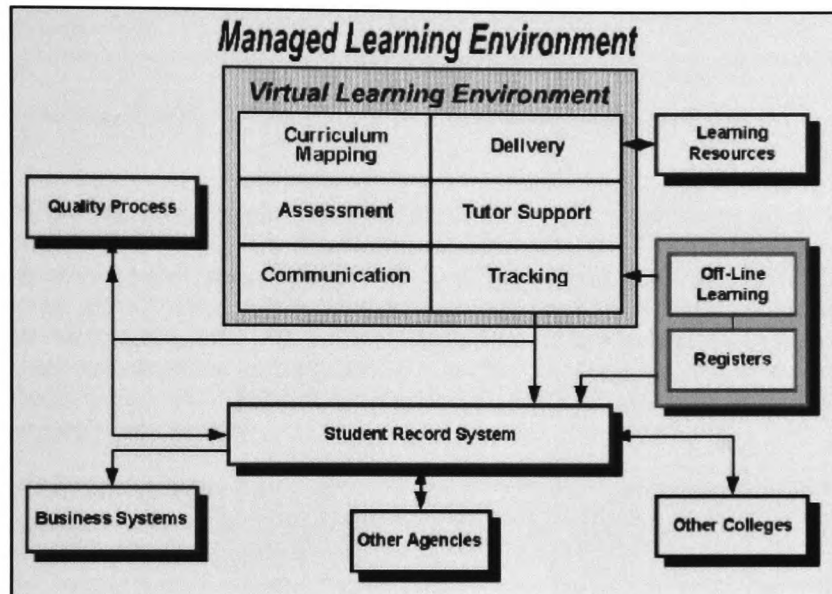
By having access to a wide range of materials and resources, students can develop their knowledge and thinking along pathways that they find interesting. The technology is there to make access and use easy and uncomplicated, yet fast and flexible.

The intention of this study is to provide a background to the role and place of VLE's in schools looking at the opportunities provided by such applications and the merit of developing and delivering content via such an infrastructure. Learnwise has been seen as another application in ICT. This has been a false premise and it requires consideration on a par with the schools administration system as it has whole school implications. It is not a 'small' package which is purchased via a single department and then utilised by a subject specialist within the context of their teaching. Learnwise is a major initiative which impedes and potentially changes whole school strategies, learner and teacher engagement. The schools which have had significant senior management involvement have clearly exploited the opportunity for Learnwise the most.

Many advocates of VLE's are excited about their use because of their potential to allow a resource-based and student-centred approach to learning to be incorporated into their teaching, (e.g. Collis, 1996[10]). One of the major blocks to adoption of this style of teaching and learning is the extra time and resource which it places on teachers.

Learnwise, in the context of a whole school development and infrastructure will contrast the different learning paradigms i.e. the shift from teaching/teacher-centric to learner/learning centric which involves major changes in our assumptions about and approach to the teaching/learning transaction.

[8] The British Educational Communications and Technology Agency (BECTa). http://www.becta.org.uk/
[9] Britain, S. and Liber, O. (1999). A Framework for Pedagogical Evaluation of Virtual Learning Environments. JTAP. Joint Information Systems Committee of the Higher Education Funding Councils.
[10] Collis, B. (1996). Tele-learning in a Digital World. Thomson Computer Press, London

Instruction Paradigm (traditional)	Learning Paradigm (possibly VLE)
instructor-led/ dependent, micromanaged	learner-led, self-directed
didactic/ prescriptive	active/ discovery learning
extrinsically motivated	intrinsically motivated
knowledge transfer	learning to learn
education as an end	education as a process
synchronous	asynchronous
classroom bound	'borderless'
theoretical	learning-real world integration
certification by time on task	competency-based assessment[11]

The instructor led paradigm suggests that decisions have already been made with regard to learner content, direction, involvement and engagement. The learner paradigm differs in as much that the learner is a participant in the process rather than a recipient of it. They make their own choices and this fits in very well with Learnwise where students can manipulate and engage with the content in a non-linear manner, dependent on the teaching objective. This is clearly within the 'control' and management of the class teacher. The project will attempt to compare and contrast the various approaches to classroom based delivery and extension into 'out-of-hours' access and extension as well as utilising a consistent interface for content development and delivery.

In the context of this very limited pilot – a few self selecting schools, and a project of very limited duration, the emphasis will be more on implementation and infrastructure rather than fully exploring the opportunity for a 'learner centred' approach which Learnwise potentially affords.

THE RESEARCH PROJECT AND OUTPUTS

The broad thrust of the research was to identify and describe the kinds of progress that teachers and students could make provided that the context in which they were learning was suitably configured. Issues addressed to include aspects of:

- technology
- staffing
- resources
- infrastructure
- support

The study emphasises the importance of the teaching and learning culture in which the technology is embedded, in particular the need for "ongoing internal evaluation... used by all concerned to develop more positive practice." Technology was not considered as a separate activity. It was used as a tool for delivery of teaching and learning resources, interactivity, and collaboration.

It is hoped to learn and demonstrate that successful implementation depends on factors that are:

- institutional / managerial / policy
- mediating / supporting / interpreting
- individual / teaching / learning

[11] Pan, D. (2000). The Centre for Development of Teaching and Learning (CDTL). The National University of Singapore.

Such aspects will have a clear consequence on planning, school strategy and infrastructure. It is the intention to identify what these factors might be and how they work. The data from the schools will hopefully enable us to evaluate:

- where did they start from?
- what did they do? why?
- how did it work?

Clearly it does need to be appreciated that this piece of work is a pilot of limited scope:

- not open-ended time-wise
- compressed time-scales
- small skewed sample of teachers
- small skewed sample of schools
- small subject spread
- limited opportunities to gather data
- differing rates of uptake and embedding in the sample

The limitations of the findings need to be recognised and how generaliseable they might be, and not to make assumptions based on other sector experience i.e. FE and HE.

There is no attempt, on the part of the Research Centre, to impose methodological constraints upon the teacher/researchers within or across the schools, except to recommend that teachers recorded each stage in the developmental process, as the project progressed (perhaps including some classroom observations) and questionnaires and interviews were used to draw some conclusions during the project.

Two-day visits to each school were scheduled during the project. In some cases this has not been possible, but alternative data collection has been extended to the schools. The following represents the intended structure for each visit, although again not all facets were able to be addressed in every school:

- observation of lessons utilising Learnwise
- interviews with teachers (subject teachers who have developed materials)
- interview with head teacher/deputy and/or head of ICT
- interview with technical support
- interviews with students

Each visit was dedicated to discussing, clarifying and agreeing the issues associated with the integration of Learnwise into the school and curriculum.

The outputs are based on the observations and interviews conducted with participants at the school. Due to the varying nature and expectations of the school implementations the consistency across institutions cannot be guaranteed.

In some cases the teachers expectation and realisation of the tasks involved were not realistic. The fact that the system was not a replacement but an exploration of alternative and enhanced delivery and learner engagement models was not fully understood by those involved in the project.

FINDINGS

All the schools were technologically very well equipped in the sense that they all had an excellent student to computers ratio, significant network infrastructure and in one case the ability to utilise a wireless network. All the schools had dedicated computer suites and in most cases more than two suites could be timetabled. All the schools also had distributed networks so that individual students could access the system out of the classroom, although this was not always utilised or available due to the constraints of the classroom- based activities which were developed. What the schools lacked was sufficient external access to enable homework to be conducted either via the Internet or direct access into any school server. It must be said however, that even if access were possible, the link, which at best was 2 Megabit, would have sustained this limited pilot, but the aspirations of the staff to include audio, graphics and video could not be fully supported.

The staffing, both for content and delivery, within each school was radically different in each case. What is evident is that where a senior member of staff was involved this had a major positive impact on any implementation. The following represents a summary of the dispersion of Learnwise subject use and its associated staffing and content creation. The majority of content was created for year 7 and year 8 students with the exception of 3 schools who used it additionally for 6th form (year 12/ 13) support, and ICT GCSE course and for a year 10/ 11 NVQ vocational course.

- **Geography** – developed in at least 2 schools with a variety of links, resources and associated material. Individual staff developing course material and learning the skills and alternative methods of delivery for themselves.
- **Religious Education** – 2 schools but very different environments. From simplistic data representation to philosophical discussion and moral items being presented for group and class debate. The material was sourced and authored by individuals delivering the lessons.
- **Mathematics** – 2 schools who utilised Excel. to integrate worksheets into Learnwise. Based on individual teachers worksheets with some embedded formulae and in one case the use of Visual Basic.
- **Physical Education** – 1 school provided additional learning resources to students studying tennis and addressed the associated physical and physiological content of the curriculum. Resources were developed to teach the skills on refereeing, conduct, diet and training, and that by looking at web pages, you maybe talking to players in other places.
- **Travel and Tourism** – 1 school which explored a variety of resources including additional software located on other hardware. One teacher developed the material which was aimed at providing alternative media, links, documents, images, for students to consider as part of an NVQ course.
- **Science** – 2 schools with different approaches, from an individual member of staff creating significant and interactive resources for departmental use to an individual science teacher creating their own content from existing class based materials.
- **ICT** – 1 school utilising the tools to develop dialogue and discussion about ICT topic areas related to the GCSE course.
- **Citizenship** – 1 school very creatively addressed the problem of enabling all the students in the calls participating in the discussion by managing the process via a collection of ordered and organised 'chat' sessions.
- **Mechanisms** – 1 school trying to develop quite complex visual images. The movement of cogs, gears, mechanisms is difficult for students to visualise and the teacher developed a 'toolkit' which whilst sitting outside Learnwise used the VLE as a stimulus and 'mentor' for interaction.

Many of the schools had their own websites and Intranets and saw the VLE as an extension of the Intranet, which was invariably an information portal and message board for students, parents and external agencies. School Intranets had the prospectus, course and school information, but very little interactivity, if any, was provided. One teacher commented:

'I think being a technology college and the fact that the school has been moving towards using its own website in an interactive role gave us an opportunity to look at a VLE which gives additional add-ons to what we have, and at the moment, our website is primarily just content based with a few interactive resources on there, although if I am being honest interactivity is limited to moving a mouse. There is nothing which gives a more sort of holistic approach which I think the Learnwise programme possibly does.'

All the teachers interviewed have been positive about the opportunities and viability of concept and have all used Learnwise in a vast array of different ways and at varying degrees of interactivity. Few teachers have had the opportunity to fully explore the tools and significant functions available to them as teachers and students. Staff involved have limited themselves to specific areas with which they are familiar, although for all involved, the uploading and editing of content was a new venture which they all found relatively straightforward and not technically demanding. The environment was centred around delivery and interaction with that delivery, with the exception of one school who have used 'chat' extensively. Some comments from staff and students involved in the project are enclosed:

- **Deputy Head** – 'Learnwise has enabled me to open up the 1 hour lesson time, not constrained by the bell. Class-based activities can be continued by students as homework or just outside the classroom and in the students own time.'

- **Mathematics Student (year 8)** – 'It is fun, not something I normally say about Maths! Not just using the computers, but in getting the answers marked as soon as I have entered them. I do not have to wait for Mr X to mark all 20 and then find out that I am going wrong.' (The consequences for this particular activity meant that students called on the class teacher much more as students were confronted after each question was answered!)

- **Class Teacher** – 'Learnwise has provided me with a stimulus for teaching and learning styles. I am able to reflect, albeit briefly, on what I want or need to do in translating my 'traditional' content into an interactive Learnwise format.'

- **Religious Education Student (year 7)** – 'My work is not lost. I can review it later and even continue with it at other times outside normal lesson times, even in the library!'

- **Citizenship Student (year 8)** – 'We have used the 'chat' to discuss human rights issues which has been great. This is because I would not have voiced my opinion in the normal class as it is always the same 3 or 4 people who do all the talking. I have realised that I do have an opinion and can share it with my partner and then discuss with other people online. I can then print out the chat and look whether I made a difference to what other people were thinking.'

- **Geography Student (year 9)** – 'The ability to see a variety of things in different ways is much more exciting, yes we do use videos, but I can control this myself and it certainly beats just using the text book.'

The cost in developing the content was acknowledged to be significant and whilst all schools without exception gave tribute to Granada Learning, because they actually paid for schools to go to be trained. Granada Learning also provided significant onsite training and considerable telephone and email support. The cost in time is something that staff had not realised and it was felt very difficult to quantify. Although the 'feeling' is that it probably takes 15 hours of teacher time to produce 1 hour of material for students – but it might be, in some cases, 6 hours and it might be in other cases 30 hours. Some teachers commented:

- 'I was conscious that this was a new opportunity, so I didn't just want to type my notes and put my notes on to the server. I was looking for a new and innovative way. I was also keen to ensure that there was some form of collaboration, so that this wasn't one student interacting with one machine; this was a group situation, and so my 24 students in one particular class and 22 in another class were always divided into groups of 4 or 5 and so part of the work was done collaboratively and little or none of the work was done individually by students. So this made my development time much more complicated.'

- 'It's harder to prepare materials that allow you in some way to actually assess what each member of a group has done, but I suppose in reality, as long as everybody was learning something, then we don't need to worry about formal assessment because, at the end of the day, the GCSE results will provide that. It was a great asset though for the students to be able to use the Learnwise activities to individual assess their progress. *My GCSE results last year were absolutely phenomenal from the two classes that had used a VLE, and although it is difficult to demonstrate I think that it is due to the VLE.*'

Some of the future priorities from teachers, heads and staff involved in schools for implementing Learnwise further include:

- 'A way for teachers to disseminate coursework information, homework and stuff to students so they can access it from home or if they like in class out of hours. So it is a way that if a student is ill, or for example, as it's a sports college they are off training, they can get into Learnwise find out what they have got to do, find out what the scheme of work is and sort it out. Parents, if they are concerned about students being set homework can have a look and see what the homework was last week and see what they are suppose to be doing, they can then attempt it. Now that in itself is a big step, it means getting the curriculum stuff on, it means getting the teachers involved and that isn't going to happen overnight, and getting teachers used to this idea that parents can log in and see what's happening. That I see as a very important step forward, as we are always working with the parents and that is a very important tool for us in keeping the children motivated. I feel that this is possible through Learnwise, but its not just the technology that's the problem there it is educating the teachers involved, it is training them, it is giving them time to stick all these things on.'

- 'I would like to see some sort of training day for staff within the school so that they can learn how to use it – obviously, there is preparation which needs to be done before that, and if it's going to be effective, staff would need to bring maybe some resources of their own which they think would be useful and have a general background of what it can do.'

- 'I think what would be useful is if you got all those involved and the geography teachers got around and said I'm doing this you are doing this. Then you have a network of the Geography teachers or R.E. teachers or who ever is involved and you could swap the information. That would be lovely and I don't know if that is how it's going to work, or if that's going to happen, so that I could say right I'll do these three units and somebody in Hampshire will do those three units so you could say to the kids right we have done this, we have desertification and this Learnwise package that you used with flooding with me is there for you to use.'

- 'I would love to use it with GCSE courses. I see massive benefits in terms of the GCSE, especially year 10 GCSE. It would be useful for consolidation, revision, practice and personal reinforcement all in one place. This will be an increasing requirement as we continue to stratify the examination courses and try to individualise examination entry and participation for classes of 30 or more students!'

- 'I would like to think that you could actually take a scheme of work for the year and use Learnwise in all aspects of the scheme of work, throughout the year, particularly with homework. I think this is possible, but haven't been able to try it out. With maths I can see that you could actually spend 75% - 80% of lessons on Learnwise, I think you would need the extra 20% – 25% doing more problem solving exercises with more analytical skill development.'

- 'What I would like is Learnwise to be looked at by other departments and eventually I would like to be able to say to you or to an inspector in two years' time to say, 'we have a virtual learning environment – it's the Granada Learning Learnwise scheme – it has materials on there – the children are able to access in school and out of school, that allows them to work independently and breaks down the barriers between home and school'.

- 'I don't think the content is the issue for the other teachers – I think what they want to see is something that is user-friendly, that would allow them to create a similar structure to then download into the structure and the content that they wish to show. Now, we have an advantage in that, because lots of departments have worked on resources for the Intranet, but haven't actually loaded them into the intranet system, so in terms of a training role, X's role and my role and Y's role, hopefully, would be to present to the staff the Learnwise programme to show them the structures and with them, create the structures and then leave them to create and download the content.'

- The initial sort of reaction from my observations that I've had of the pilot scheme is that within the Science departments, they are now feeling comfortable with what they're creating, how it can fit into a scheme of work and I would be looking for that to be consolidated between now and the end of this academic year. With the opportunity to work with a couple of other key departments in the Easter/Summer terms and briefing them about the scheme, offering them the appropriate in-house training, making them aware of what the bigger picture is – because this isn't just something, as you were saying, a small development – this is the big picture. And I would be hoping that by September 2003 we would have something like 3 key faculties working with Learnwise on working on the content and enriching that particular faculty.

- 'As a Year Head the value to me – although I am not dismissing the value in terms of the use in Science – is the ability to individually monitor and track the progress, not access would be great. So when students are falling behind across the board, say Science, Maths, English etc, then she'd be able to pick up on Jimmy Smith, for example, perhaps much earlier on, and you could set benchmarks, if you like, so when marks fall – or marks or attendance or whatever, falls below certain limits, then send an email to the year head or whatever, saying you need to be aware of this – I guess try and create an individual learning account, if you like.'

- 'I want it to be interactive, which the Intranet isn't really. I don't want them to just sit and read something and then do it, I want students to be able to interact with the content, rather than just tick the box and fill that in, to just to get their enthusiasm going. The year 7 at this stage are pretty much on the ball and want to learn, it's by the time they get to year 9 that they start dropping off and they aren't interested.'

TRAINING AND SUPPORT

The support which was available to the teachers came from a variety of sources, Granada Learning based hot-line support, Granada Learning based local training, ICT in-house support, ICT 'Champion' support.

The schools welcomed the local bespoke Granada Learning training and valued the opportunity afforded to them to contact a support person when required. Whilst this is reasonable for a small pilot of limited scope, such one-to-one support is not sustainable for Learnwise as the number of schools increases and the complexity of problems ensue.

CONCLUSIONS

Whilst technology has been in the classroom for some considerable time its use as an interactive learning tool is in its infancy, in the sense that it can utilise significant communication tools to foster collaboration, self directed learning, group work, in and out of school access etc. The problems of in-service training, modification of method, and investigation of differing skills needed for a future of ubiquitous use all remain to be investigated. In those schools which have seriously thought about the implications of a VLE in at least part of the school, it is evident that it could:

- support the curriculum which is already being offered;
- enhance the curriculum so that what students are offered is rather better than what was offered previously;
- extend or even enhance and change the curriculum.

All this, or perhaps a considerable part of it, could be done without ICT and the VLE, so why use it? It is evident from current research as well as the limited data available for this project that the VLE provides a focal point towards which the students may direct their information. It is a medium that will present the results of their 'thoughts' and as such is no different from a wall display or a page in their exercise book. Where it scores over other media is that it is capable of transforming that information and allowing the students' work to be brought to life, manipulated and exploited for the maximum value. This potential has yet to be fully realised and whilst the schools imported some very limited content into Learnwise the experience of the students was very positive.

The use of Learnwise can be seen to affect the teaching-learning situation in a variety of ways. It affects not only the way in which the lessons are organised, but also the detailed structure of the events within the lesson and potentially outside the lessons. The pilot schools limited technical infrastructure stifled this opportunity for school-home extension, but certainly out of hours and out of lesson access was feasible, encouraged and happening.

Whilst the 'Tools' available within Learnwise were not generally used, where they were, as in the case of the class based activity on human rights, the participation rate and dialogue was considerable, and significantly more than the more 'traditional' approach to class based discussion. The VLE's ability to foster an increase in small-group work and in student-centred discussion is a major asset.

The episodes, of 'sowing' seeds for discussion, which some of the teachers facilitated, formed the basis of much of the teacher-student interaction in the small group, this provided an opportunity for the teacher to individualise the learning experience. The appropriate use of questions, assertions, observations, additional input etc., enabled the teacher to respond to the needs of the individual student at a personal level: such responses are rarely possible in normal class teaching. Direct interaction allows the teacher to gain insights into the problems faced by the student, and allows the student to check and/or develop their own understanding of the topic. Whilst this small scale project cannot possibly justify this exposition it was clear from the classroom observation made by the researchers that students were actively engaged rather than passively sitting in the classroom working through exercises.

Teachers interpret a vast array of resources and materials, and attempt to make them a legitimate part of the classroom work. In the best of circumstances, the availability of computers with high 'quality' software can facilitate and extend the work of classrooms, and can support teachers in examining the ways in which they organise students' learning. The technology is not simply a new educational device whose effects on classroom life can be readily measured. Rather, it can provoke teachers (to greater and lesser degrees) to think about both the legitimacy of this work, and the types of learning interactions that occur in their classrooms. Whether this 'provocation' will result in visible changes in how learning occurs in classrooms is not yet clear.

What is clear is that the presence of computers can disrupt the framework for the social organisation of work in interesting ways. Computers can facilitate both collaborative interaction among students (that is, students sharing equally in the interaction) and can increase opportunities for students to act as expert resources for other students (that is, one student providing help to another). Neither of these forms of interaction occurs often in most classrooms. In work carried out by Hawkins et al., (1993[12], 1994[13]), they observed more collaboration among students, more solicitation of help from other students, and more 'dropping in' to make comments or suggestions, in computer based activities than in non-computer activities in which students were permitted and/or encouraged to work together. Certainly the 'enjoyment' in a mathematics lesson on directed numbers was a sight to behold when students were engaged with Learnwise! Learnwise enabled teachers, particularly those who considered themselves to be 'noncomputerate', to adopt and adapt a strategy for computer use in their classroom. It provided the means for the teachers to develop the 'quality' of the learning environment without the consideration of the technology within that environment.

[12] Hawkins, J., Sheingold, K., Gearhart, M., and Berger, C., (1993). Microcomputers in Schools: Impact on the Social Life of Elementary Classrooms. Journal of Applied Developmental Psychology, 3. Pg. 361-373.
[13] Hawkins, J., (1994). Paired Problem Solving in a Computer Context. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

The findings listed below are based on the very limited interviews and observations which took place over the project, and some brief comments are made. It must be emphasised that a considerable amount of this data is highly subjective and therefore must be treated with extreme caution. This report constitutes a summary of a pilot project and no comparison with control groups, baseline data or counterfactual data has been considered. It is an exploration into the viability of concept and of the Learnwise VLE in schools.

1. Student Performance -In all classrooms there was an apparent increase in motivation. The evidence also suggests that there was increased commitment to classroom activities and greater participation in co-operative group work. This was more noticeable in the older students. In general, teachers believed that overall performance of most students improved during the project.

2. Teacher Performance -Most participants believed that the project increased their skill, knowledge and understanding in regard to the possible use of computers in the classroom. The increase in skill, knowledge and understanding differed among individuals.

3. Creation, management and organisation of courses – Learnwise has enabled staff to organise their lessons. It has also helped them to reflect on what they are doing and consider possible alternatives as well as different ways of delivery.

4. Facilitate pedagogical design -Learnwise allowed the specification of the contents and structure of the package directly on to the computer. This allowed the teachers to upload their materials without any real technical competence and the using the editor to make changes easily.

5. Skill development and enhancement -During the course of content development, staff have also been aware that their own ICT skills have been developed and enhanced. This is consequential and whilst welcome is not a rational for VLE development.

6. Homework and extension work -Learnwise potentially allowed the homework to be considered as a viable extension of class based work and practice. (Whilst teachers thought about this, the technical constraints of access made this unachievable.)

7. Immediacy -Students were able to participate in various activities, which give an immediate response, and in some cases feedback was provided which has significant formative application for students' own personal motivation. The students were also able to engage in supportive activities with their peers as well as teachers.

8. Sequentiality between development phases -Students were able to 'dip' or navigate through the material in different ways. The structure was not sequential or hierarchical. This made the management and control of lessons potentially problematic. The teachers felt that this structure provided an opportunity to extend the more able students and to provide additional support for the less able. The teachers did acknowledge that this type of organisation within lesson is complex, and requires careful consideration of content across a range of abilities.

9. E-mentoring -Teachers have been able to keep in contact with students by using the email and chat forum facilities of Learnwise. The students also accessed additional external resources and help pages. This has allowed students to seek help with problems, course advice and revision strategies.

10. Collaboration -Students are able to participate in structured and unstructured chat and forum sessions with fellow students and staff.

11. Inclusion - Students who are unable to get into school, e.g. because of illness can keep up with the course via online work.

12. Hardware -The greatest single deterrent was the access to the network. The number of PCs available was impressive, but the time delay in logging onto the network and in validating users was in some cases unacceptable. Exploiting the full range of activities and applications requires immediacy in terms of student access.

13. Professional Development -This project was viewed favourably as it supported and encouraged participants to relate new knowledge to their career and classroom experiences. It was also innovation focused, provided a conducive setting, focused on practice and the sharpening of skills, displayed collaborative and committed leadership, established relevant internal and external support structures, and encouraged joint planning and collaborative control.

Many authors have reported on the role, which computers can play in motivating learners in a wide range of situations. A disappointingly large number of studies are somewhat suspect because of the unrecognised presence of Hawthorne effects, but even when allowance is made for that, it is clear that computers can play a much needed role in helping to maintain students interest and enthusiasm to learn. The ACOT research by Dwyer[14], provides convincing evidence that these enthusiasms are not short lived. That research, conducted in technology rich classrooms, also shows how profoundly computers affect the fundamentals of teaching and learning.

'One of the main objectives I had was that the project was going to force me to look at learning strategies, particularly with computers. It's because there is a focus for it. Unless there is a focus for it, you may not take it as seriously or do it in as much depth as you might if you didn't have a focus... getting them to question themselves, and to question myself. To get an interaction going between the children and myself, so that the learning process becomes more understandable to them, while they are doing it. I think that's interesting.'

When interviewed, the small sample of students felt that the use of Learnwise enabled them to understand in more depth about some of the work. They could interact with it and get immediate response to answers, which they entered. They were also able to jump to other sites recommended as part of the course content. The ability to have a 'chat' space which they could review, was seen as a really useful opportunity to participate rather than receive information in lessons.

One final conclusion, or observation, is that the study has raised more questions than it has answered. Given the apparent positive attitudes to the use of a VLE and Learnwise, much more investigation is needed regarding the genesis of these attitudes. Questions regarding the students' concepts of the activities and resources need answering. What aspects of the role of Learnwise contribute to the positive attitudes also needs investigating and finally, how should the VLE be used in the classroom in order to capitalise on the positive attitudes and motivational aspects indicated in this study? I have endeavoured to go some way to provide answers to the above, but the inter relationships and dependence of various attributes in vastly different environments make the task most difficult.

The use of technology and classroom interaction is rapidly developing and changing the contexts of what is taught and how it is learnt. There is a exciting situation where one individual may be a 'learner' one moment, a 'teacher' the next. Indeed, the emphasis is turned upon dynamic relationships where the experience both of teaching and of learning becomes intermingled. Learnwise has demonstrated that it could be part of this relationship between the role of teacher, facilitator, student, 'school', and 'home'.

For this to happen effectively, significant thought does need to be given to issues of content (both design and development), technology and communications.

[14] Dwyer, D. (1994). Apple Classrooms of Tomorrow (ACOT): What We've Learned. Edutainment, August/September 1994. Pp. 4-41.

Whilst it is appreciated that the above is essentially anecdotal evidence. There are clearly some gains being expressed from all the participating schools, teachers and students. What is apparent are two 2 major concerns.

1. Technological:

a) There is a need for both distributed hardware and ICT suites, but the overriding requirement is a network which is fully distributed school-wide and at whatever maximum network speed can be achieved. One school that uses a wireless network spent several frustrating minutes logging on to the school network before accessing Learnwise.

b) Hosting of the Learnwise environment and content is a potential problem. Initially schools considered local school based hosting, and some then moved to Granada Learning hosting the school services, so that external access could be achieved. The difficulty to be considered for the future is in the maintenance of a 24 hour by 7 day service which has fast access for multiple users i.e. can support significant student and teacher access and multiple file support, video, audio and graphics. It would appear that maintaining a local multimedia Learnwise server providing whole school access, on and off campus, is not really viable and certainly in discussion with school IT managers this is a major concern as teachers become more 'adventurous' with their content development.

c) Whilst the technical competence of the ICT coordinators and technical support staff is most impressive, in many cases the infrastructure is not optimised or 'professionally' installed. This also relates to software versions, which are on the network and access controls and permissions. This is no reflection on any school or individual in any way.

2. Content:

a) Whilst teachers have significant content. It is invariably not in a format appropriate to online delivery and interaction. Simply importing such material into Learnwise, or scanning pages from a text book is unsuitable.

b) Teachers have significant competence in their chosen subject areas, they require time and support to reflect on the teaching material and to extend it by utilising additional content from other sources.

c) Teachers value collaborative activity and would welcome an opportunity to develop interactive rich content and activities, to include multiple media. They will need considerable guidance and facilitation if this is going to happen.

'ICT has a motivational effect on both staff and students,' Cox[15]. This aspect was also identified by Preston, Cox and Cox[16] when both teachers and students were able to use the computers to transform the ways in which they worked. Learnwise potentially provides this opportunity, but clearly this is only possible where access is supported by student and teacher autonomy, training, support and necessary collaborative engagement to gain maximum impact on learning.

This is a research programme, in terms of the quantity and quality of the outputs from the participating schools and the issues with implementing such a system. It makes no attempt to account for the distribution of those outputs across the schools. The preliminary development, research and data collection was carried out by the teachers themselves, with the research initiated and carried out by the National ICT Research Centre. The project was conducted between May 2002 and November 2002. Within such a limited time frame a full-scale research programme could not be realised. The findings are indicative only and suggest a possible role and utilisation of a VLE within the pilot schools. There is no attempt to quantify any changes in either motivation or student attainment. Equally detailed qualitative analysis of staff and students is not considered due to the limited duration of the project and the considerable number of possible variables within the cohort of schools studied.

[15] Cox, M.J. (1997). The effects of Information Technology on Students' Motivation. NCET. Coventry.
[16] Preston C., Cox, M., and Cox, K. (2000). Teachers as Innovators, An evaluation of the motivation of teachers to use information and communication technologies. London. MirandaNet.

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The VLE is unlike any other piece of school software in as much it is content independent, i.e. an empty shell. This has been its strength but also its weakness. It can be manipulated to deliver 'personal' content in a variety of formats, engagements and collaborative activities. However, busy teachers who lack basic ICT competence may well feel intimidated by this lack of content.

It is apparent that Learnwise has the potential to play a role in the classroom and school, especially in home study but there is a need to consider centrally managing the 'hosting' and content development in order to impact significantly on classroom learning without the burden of the technological management overhead and the considerable resource required to develop interactive content.

John O'Donoghue

Senior Research Fellow
National ICT Research Centre

Technology Supported Learning and Teaching: A Staff Perspective. (Ed)[6].

John O'Donoghue

Preface to book

Successful uses of appropriate innovative technologies by staff and students in education is not a mystical or ethereal goal. Real innovation is often driven by the passionate few, frequently developed in their own time and enthused by a real desire to make a difference to the learning of their students. This motivation is not unique, unusual or perhaps unexpected. However the real problem is in 'mainstreaming' this innovatory practice or activity.

Technology has been used in education for some years now. And yet it still appears not to be making any significant difference to areas of learning which students are exposed to, or the way in which we teach. For example, we still have serried ranks of often hundreds of students in lecture theatres, we still assess their learning by sitting them in examination halls and asking them to regurgitate memorised information, rather than to apply knowledge.

Academics in the main are not anti-technology. They frequently use the computer to write, analyse, present and communicate with colleagues and students. So why is it that it is considered sufficient to put online what works offline and expect the same responses and acceptance from the learner? We would not expect to learn a practical activity solely online, would we? If I want to learn something about nature, I have to experience it. Simply transferring class based notes into an online repository or Virtual Learning Environment is insufficient if we are to equip our citizens of the 21st century to be able to evaluate, problem solve, criticise and ultimately create new knowledge.

I will qualify this by suggesting that some of my colleagues feel that they have developed eLearning based courses by 'allowing' students to submit assignments by email. We can all identify with colleagues who now put their PowerPoint files online and 'advise' students that the formal lecture is no longer required. If this is all there is to this eLearning phenomena then there is very little to get excited about. It will have changed very little of what we do as educators and, in fact, in some cases, we have regressed into learner disengagement.

The barriers to the use of technology within education are often blamed on the more tangible assets i.e. communication links, limited hardware, inappropriate software etc. This is understandable, but equally easily addressed. The 'real' and more difficult issues are with the culture, nature, motivation and resistance to change within institutions, establishments and infrastructures and the staff within them.

The content of this book highlights the many areas in which practitioners are attempting to implement learning technologies and reflects themes of current topical interest. The book has three main sections: Infrastructural and Cultural Issues, Pedagogical Issues, and Technological Issues. The first section on infrastructure will consider aspects related to the major infrastructural, cultural and organisational changes required, if innovation is going to effect any change in the institutional regime. It will focus on the role of the student and the tutor in the learning process. The section on pedagogical issues will present descriptions of the different ways in which practitioners have attempted to use learning technologies and give personal examples which illustrate both the potential and dangers of learning technologies. The section on technological issues will present descriptions of the "tools" that practitioners are using, outline their strengths and weaknesses and highlight issues that need to be considered when planning to implement new learning technologies. The "tools" covered will include web-based tools such as Virtual Learning Environments and Computer Mediated Communication, as well as non web-based tools such as videoconferencing

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[6] O'DONOGHUE, J. (Ed). (2006). Technology Supported Learning and Teaching: A Staff Perspective. Idea Group Publishing. ISBN 159140963-2.

Whilst the chapters are located within a section, the nature of technological use cannot be so compartmentalised, so many of the studies and topics reported here cut across many boundaries, infrastructural and cultural, pedagogic and technological. The key issues that will be highlighted and discussed include widening access and participation, student-centred and collaborative learning and the changing role of the tutor/ pupil/ student.

Chapter Descriptions

This book consists of 19 chapters, written by 37 authors, loosely grouped into three sections as follows:

Introduction/ Chapter 1
An Introductory Reflection.
John Cowan.

This chapter introduces the issues, implications and cultural upheavals posed for the staff in higher education by the advance of technology. It does so from the standpoint of someone who has been an innovative university teacher, but who is now retired and mainly serves as a grass roots teacher. It summarises the challenges he has been encountering recently, and concludes with questions which he hopes will feature in much imminent, and needed, action research.

Section 1: Infrastructural and Cultural Issues

Chapter 2
What Lecturers Say Helps and Hinders their Use of a Virtual Learning Environment to Support Face-to-Face Teaching.
Sue Morón-García

This chapter provides an overview of issues lecturers said they faced when using a Virtual Learning Environment (VLE), such as WebCT or Blackboard, to support their face-to-face teaching. It draws on data collected for doctoral research that explored the reasons lecturers gave for their use of a VLE, the teaching approach supported and the factors affecting this use. It concentrates on the latter and as such contributes to an under researched area by reporting the subjective views of academics who have adopted information and communications technology (ICT) to support their teaching.

Chapter 3
Academic experiences of using VLEs: overarching lessons for preparing and supporting staff
Barbara Newland, Martin Jenkins and Neil Ringan.

This chapter describes drivers which have influenced the adoption of eLearning within the UK HE sector and resulted in the increasing adoption of VLEs within institutions. It identifies a range of issues at the institutional and individual academic staff levels which need to be considered and addressed when designing and implementing a VLE within an HE institution. The authors draw on their personal experience in supporting a diverse range of academic staff to integrate eLearning and VLEs within their academic practice, and their experience in implementing VLEs in a range of institutions to develop a series of guidelines and lessons for institutions to consider.

Chapter 4
Using Asynchronous Computer Conferencing to support learning and teaching in a campus-based HE context: beyond e-moderating.
Pat Jefferies and Roy Seden

This chapter details research into the use of Asynchronous Computer Conferencing (ACC) within a campus-based Higher Education (HE) environment. Firstly, it will highlight some of the issues impacting implementation of the pedagogy. The findings are summarised from a piece of action research that was conducted over a period of 5 years with final year undergraduates studying ethics/professional issues in computing. The main objective of this research was to investigate and subsequently develop Salmon's (2000) 5-stage strategy for implementing ACC. Finally, the chapter will not only develop the Salmon (2000) model but will also challenge the necessity for e-moderating online discussions within a campus-based HE environment.

Chapter 5
Improving ELearning Support and Infrastructure: An Evidence-Based Approach
Carmel McNaught, Paul Lam, Christina Keing and Kin Fai Cheng.

This chapter reports a study conducted in 2004 at The Chinese University of Hong Kong (CUHK) aimed at obtaining a much clearer picture about the use of eLearning at the University so as to develop new strategic directions on a firm evidence base. Multiple sources of data were collected, including: site logs, experts' review of selected active websites, and interviews with 26 teachers. The data illustrate that eLearning at CUHK is still largely in the 'innovators' and 'early adopters' stages (Rogers, 2003). There lies a 'chasm' ahead inhibiting moving further into the 'mainstream' area. The analysis of the data revealed that what the teachers *want* from the technology, what they actually *do*, and what they can have access to for *support* are not totally aligned. The focus of the chapter is on how to improve this alignment so as to bridge the chasm.

Chapter 6
Developing ELearning Provision for Healthcare Professionals' Continuing Professional Development
Susi Peacock and Gloria Maria Dunlop

This chapter discusses the provision of continuing professional development (CPD) for Allied Healthcare Professionals (AHPs) through eLearning. External pressures are increasing on AHPs to engage with CPD on a regular basis to improve the quality of care services and facilitate changes in working practice. ELearning has the potential to reach this group of diverse learners and integrate learning into their work schedule at a time and place convenient for them and their employers: eCPD. Ultimately the findings suggest that the solutions provided meet the needs of this specific group of learners and are potentially transferable for all eLearners.

Section II: Pedagogical Issues

Chapter 7
Staff Perspectives on ILT: findings from a national evaluation of the learning and skills sector
Colin McCaig and Maria Smith

This chapter examines staff perceptions of Information and Learning Technology (ILT) in the learning and skills sector in the UK. It is divided into two sections dealing in turn with pedagogic and cultural issues. The section on pedagogical issues explores the use of the VLE/intranet as an alternative teaching method, and asks why these modes of learning are comparatively rare in the learning and skills sector. This section is also concerned with perceptions of the impact of ILT on students' retention and attainment and explores the concept of variable use and variable impact by level and subject area. The cultural and infrastructure issues explored in the second section relate to staff development and training opportunities (such as the number and type of courses on offer) the additional help requested and the barriers to further uptake.

Chapter 8
Drivers and Barriers to the Uptake of Learning Technologies:
Staff Experiences in a Research-Led University
Alison Davies and Kelly Smith

The authors discuss key findings from three focus group discussions held with practitioners in a higher education institution about their experiences of using learning technologies to support student learning. Focus groups were organised in March 2004 to further explore staff responses to a 2003 campus-wide survey, which gave a general overview of learning technology use amongst teaching staff. The chapter examines the key issues that staff raised during the focus group discussions, including the barriers to and implications of introducing and implementing learning technologies into different subject disciplines within a research-led institution. The question of whether or not the use of learning technologies enhances, or has the potential to enhance, the teaching and learning experience, and the lessons that staff have learnt from this use are also discussed.

Chapter 9
Constructivist ELearning for Staff Engaged in Continuous Professional Development
Roisin Donnelly and Ciara O'Farrell

Professional development for academic staff in eLearning is currently a priority for higher education institutions in the Republic of Ireland, as lecturers experience increasing demands to incorporate eLearning into their teaching practice. This chapter reports on the design and implementation of a blended module in eLearning for the continuous professional development of such lecturers. In it the co-authors (who designed and developed the module) discuss the effectiveness of exposing lecturers as online students in order to experience first-hand the advantages and disadvantages of eLearning. It argues that a constructivist, collaborative interaction can provide the scaffolding for lecturers' future journeys into eLearning and into constructivist practices within their own teaching. Important outcomes were achieved in terms of influencing lecturers' thinking and approaches to both their own and to their students' learning.

Chapter 10
Staff using an institution-wide VLE for blended eLearning - the implications of student views
Paul Brett

This chapter reports on an investigation into the institution-wide use of a Virtual Learning Environment (VLE) in a UK University. The aim was to collect information on staff use of the VLE from the student perspective. It was used to evaluate, and reformulate, current eLearning strategic initiatives aimed at enhancing the VLE-based student experience. Three aspects were investigated. These were: (i) the amount, mode, and location of the use of the VLE; (ii) respondents' perceptions of the nature and value of their teachers' VLE support; and (iii) respondents' preferred uses of VLE-based learning. Analysis shows a predominantly information transmission mode of VLE use, with only some use of active learning. Respondents requested more VLE-based formative assessment opportunities. The chapter concludes with five considerations for strategic development of blended eLearning and with three for staff using VLEs.

Chapter 11
Teaching large groups: Implementation of a mixed model
Andrea Chester and Andrew Francis

This chapter describes the experiences of the authors as lecturers in the development of a new approach to teaching large groups of first year undergraduate students in psychology. Online material, with a strong emphasis on active engagement, is used to introduce students to the content before undertaking a more detailed reading of the key theoretical and research issues in the textbook. With this introduction to the material, lectures function as a 'Review and Discussion' session rather than a didactic monologue. Outcomes of the mixed method suggest no adverse effects on student performance and staff and students evaluate the new approach favourably. The mixed model approach to teaching large groups is one that might be adapted for a range of disciplines and content.

Chapter 12
Patchwork e-dialogues in the professional development of new teachers
Moira Hulme and Julie Hughes

In this chapter the authors contend that the encouragement of reflective writing within professional learning programmes is not new. They suggest that electronic technologies, however, afford exciting opportunities to develop this practice to support participative and collaborative learning beyond barriers of time and place. This chapter explores the value of asynchronous dialogue in creating and sustaining communities of practice, with particular emphasis on the role of the e-mentor.

Chapter 13
Understanding Roles Within Technology Supported Teaching and Learning: Implications for Staff, Academic Units and Institutions
Lori Lockyer and Sue Bennett

This chapter provides a case study of a postgraduate course focused on network-based learning, which from its original design was based on constructivist learning principles. Over time, this course has evolved to incorporate increasing use of learning technology – particularly synchronous and asynchronous communication tools. This evolution has led to a reappraisal and less emphasis on face-to-face class meetings. The course has also increased its student base through distance and offshore offerings. These shifts have translated into changes in the way the course is resourced in both human and infrastructure terms

Chapter 14
The Role of the Online Instructor as a Guide on the Side
Margaret Mazzolini and Sarah Maddison

The authors present research results and advice on the role of the online instructor in relation to a particular example of technology supported learning and teaching – the use of asynchronous discussion forums. Pedagogical issues and studies discussed are based on six years of designing, coordinating and teaching into Swinburne Astronomy Online (SAO), an online international program. Issues of implementation issues are discussed associated with the use of asynchronous forums and the induction of instructors, plus the role of the online instructor as a 'guide on the side'. As an example of issues involved in maintaining a constructive online learning environment, strategies are discussed which are used to accommodate students with varying degrees of prior learning.

Section III: Technological Issues

Chapter 15
Online learning activities in second year Environmental Geography
Sally Priest and Karen Fill

This chapter discusses the design, technical development, delivery and evaluation of two online learning activities in Environmental Geography. A 'blended' approach was adopted in order to best integrate the new materials within the existing unit. The primary aim of these online activities was to provide students with opportunities to develop and demonstrate valuable practical skills, whilst increasing their understanding of environmental management. A purpose-built system was created in order to overcome initial technological challenges. The online activities have already been delivered successfully to a large number of students over two academic years. Evaluation and staff reflection highlight the benefits and limitations of the new activities and the chapter concludes with recommendations for others wishing to adopt a similar approach.

Chapter 16
Lessons in implementing a Learning Management System in a university: the academic user perspective
Fiona Darroch and Mark Toleman

This chapter examines the implementation of two Learning Management Systems (LMS) in a university environment. Within the context of a case study and from the perspective of academic users, there is a review of the technological and organizational challenges that arise. There is an in-depth analysis of the implementation in terms of what went well and what should be done differently, i.e. lessons learned. Along with the macro-environmental factors that influence the global eLearning space, the related pedagogical issues, learning models and technological toolsets are also explored. The authors hope that the experiences chronicled in the case study may act as a lesson to others contemplating such a project of the many technical and organizational issues that need to be addressed, with an emphasis on understanding the importance of the viewpoint of academic users.

Chapter 17
Learning Through Chat: University of the Arts London Case Studies in Online Learning in Art, Design and Communication
David Rowsell and Tim Jackson

Synchronous computer conferencing, or "chat", is an effective and versatile tool of online learning, providing users with opportunities for real-time communication. Chat can be used for a variety of educational purposes, including academic seminars, student tutorials, recruitment interviews and student presentations. In this chapter the authors argue that through practice, in a socially open learning environment, chat is a focused learning activity, providing a forum where identities emerge and activity is at its greatest. They demonstrate the diverse and growing uses of chat through reference to examples from the chat archives of online distance courses at the University of the Arts London.

Chapter 18
From *SYnthia* to *Calma* to *Sybil*: Developing Strategies for Interactive Learning in Music
Michael Clarke

This chapter describes the development of software for teaching Music and Music Technology at the University of Huddersfield in three projects spanning the last twelve years. The importance of engaging music students with sound itself and the potential of technology to facilitate this is a key feature of all three projects. The value of developing software that is adaptable and extensible is explained. The lessons that have been learnt in the development of these projects are described and the chapter ends with a provocative vision for the future.

Chapter 19
Lecturing by streamed digital video: blood, sweat, tears and success
Chris Smith

Streamed video is being increasingly introduced into higher education, allowing remote students to participate synchronously or asynchronously. This chapter reports the outcomes arising from three uses of asynchronously streamed video in undergraduate psychology modules. Student feedback and estimation of the impact of using streamed video on examination performance were obtained. The feedback was sufficiently positive and, with reservations, the impact on examination performance was sufficiently apparent for it to be concluded that streamed video offers tangible benefits for the student learning experience and may improve learning performance. Tutors have a flexible, accessible and productive means of incorporating moving images into learning resources and institutions may need less teaching accommodation.

Conclusion

Computers, technology and the Internet are a valuable resource, enriching the educational resources we provide already. The key is providing appropriate environments and then reinforcing the experiences with concrete activities. It is important that eLearning be recognised as a supplement to the personal interaction provided by lecturers, teachers, parents and peers, not a replacement.

Technology provides opportunities never before available – such as remote global communication and file sharing, collaboration and exploration, simulation and active independent individualised learning. Yet school, college and university departments are in danger of sabotaging - through incomplete and, in some cases, detrimental implementation plans - the power of technology to transform the teaching and learning process.

The nineteen chapters in this book were selected from a large number of submissions. They cover vastly different subjects, group sizes and institutional types - music to geography, whole class to individual delivery and engagement, large universities to small departments. They are driven by the passion of the staff involved to 'make a difference', not by simply using technology, but by applying technology in an innovative way to enhance, enrich and extend the learning in which our students are involved.

The book presents case studies, research findings, developments and interventions which will provide guidelines and benchmarks with which the reader will be able to see how, why and where their own implementation of eLearning and Technology Supported Learning is either struggling or 'not making a difference'.

My fervent hope is that this book will make a difference to the many classrooms of computers and technology which increasing pervade and saturate our educational institutions and the lack of 'real' or meaningful learner engagement provided by this intrusion.

Using an ePortfolio for Student Centred Engagement[7]

John O'Donoghue
Jon Bernardes

Abstract

Notwithstanding any issues which technological innovations in teaching and learning might introduce, there are a variety of issues which impact upon student achievement:

- Mixed ability teaching which often means that material is repeated for less able students to the exasperation of more able students. The issue of mixed ability teaching also involves a variety of different kinds of mixed ability.

- For a variety of either 'good' or 'bad' reasons students may struggle to attend regularly. This means that some of the key issues, themes and information often have to be repeated.

- Even amongst those students who do attend regularly, there may be a wide range of levels of engagement. Whilst some students may listen effectively and understand immediately, many students may need to 'receive' the same message in a variety of formats many times until they realise the significance.

- There may be an emerging debate about the descriptive accuracy and usefulness of a variety of typology around learning styles, it is clear that some students learn in different ways, learn different things, and certainly learn at different speeds.

- Whilst there is a considerable debate about digital immigrants and digital natives, it is simply not adequate to assume that all incoming students will be familiar with technological environments nor that they can navigate around complex interfaces.

- Many academics enjoy the challenge of new groups of students each year, there is a tendency to regard students as being drawn from a similar background in terms of qualifications, ages, experience, expertise. More and more commentators are beginning to recognise that the nature of our student intake has been changing in recent years and is likely to continue to change.

In one sense the availability of a variety of software solutions should obviate the need for repeating material, students can simply be pointed at a learning resource and given encouragement to engage. In practice as soon as there are more than 2 or 3 items, students may require individual guidance in terms of 'pointing' at the learning resources. It bears repeating that students tended to neglect a thorough appreciation of the content of the electronic noticeboard just as they may neglect items posted to a physical noticeboard. In this sense, attempting to evaluate the effectiveness of a technological innovation is fraught with enormous challenges. What we have endeavoured to do is use a novel student centred environment which has hopefully an increasingly intuitive interface with which the student can engage. This has meant that both students and staff have engaged in sophisticated and complex engagements treating the technological interface as a necessary, but transparent setting.

Introduction

One of the authors is a Technology Supported Learning Coordinator for a large school of Humanities, Languages and Social Sciences with well over 100 full-time staff and several thousand full-time and part-time students. In this role he has been fascinated to explore the rapidly changing character of incoming digital natives and regularly attempts to adopt emerging new technologies to see whether it might help better support learning. The other author holds a chair in Learning Technology within a large Faculty of Health which has an increasingly diverse cohort of students – culturally and academically. The profile of the staff reflects against many such institutions where technology is not a natural part of learning and teaching. Many of the staff members are recruited from a background of professional practice which clearly informs their teaching but is not necessarily focused on technological innovation in learning and teaching content or delivery. It is in the light of such diversity of experience that this significant development and investigation took place.

[7] O'DONOGHUE, J, AND BERNARDES, J. (2007).Using an ePortfolio for Student Centred Engagement. EdMedia 2007. World Conference on Educational Multimedia, Hypermedia and Telecommunications. June 25 – 29, 2007. Vancouver, Canada. Pp. 4652-4657.

Technology has the potential to enhance the learning of students if used appropriately. It can encourage more independent and active learning as well as being an efficient means of delivering course materials (McKimm et al 2003). However the emphasis must be on sound pedagogical design rather than the technology itself (Downing 2001).

In line with many institutions, class contact times have dropped whilst class sizes have increased. This means that there is much less one-to-one interaction possible for most staff. It is increasingly likely that staff will only respond to those that directly approach them rather than seek out 'quiet' or even absent students to see how they are doing. One thing students value is the way in which weekly feedback not only demonstrates some kind of concern on the part of tutors but also enables them to judge their own pace and effort. It would appear that embedding extrinsic motivators such as requiring students to assess eLearning through tracking or assessment strategies can lead to the more intrinsic rewards of learning for learning's own sake and to students feeling involved and taking responsibility for their own learning, (Davies and Smith, 2006; Canaan, 2003). The students become actively engaged in their learning and the learning and teaching process, rather than passive recipients of knowledge and information.

The overarching and dominant concern for this is to develop teaching practice in which more students are likely to behave like 'good students' and engage in considerable private study on a weekly basis. There is a significant shift away from the 'transmission' model of lecture-based courses to one where students take greater responsibility for their learning. None the less student centred learning recognises that lectures do have a role in motivating students and maintaining a sense of common purpose. Accordingly lecturers are increasingly deploying activities in lectures that encourage the students to reflect on the lecture content and provide the opportunity to apply, refresh and consolidate their acquisition and application of knowledge. Both the evolving nature of society and the student body have led to reconceptualizations of learning outcomes and processes. Critical, reflective thinking skills, the ability to gather and evaluate evidence, and the ability to make one's own informed judgments are becoming essential learning outcomes. The model of teaching and learning must accommodate flexible, independent, delivery mechanisms. The traditional approach of jumping hurdles at the end of a particular educative milestone is no longer appropriate. Flexible Internet based delivery makes access to learning potentially easier for students who need to fit studies around other commitments, which may have previously prevented entry or access to higher education.

Earlier work with students suggest that they were very focused on 'what must I do to pass' and were instrumental in using assessment as signals about when and how they needed to work. Of course one way to get students to pay attention to all the learning provided on the module is to provide an end of module unseen exam. Extensive evaluations suggest that students not only really dislike exams and the fact that it is unseen seems to be a disincentive to study everything as opposed to an incentive to sustain attention. There is also increasing awareness that the lack of constructive alignment between the course, learning outcomes and formal examinations limit academic and intellectual capacity and application.

The evaluation evidence was gathered across two iterations of three modules over the academic year's 2005-6 and 2006-7. 180 students were involved in total. The proportion of assessment assigned to an online portfolio was 15% in some of the earliest work. This was raised to 36%, then 40%, and most recently 60% (all by way of clearly articulated student preferences in mid module and end of module evaluations).

Student Centred Engagement
The main objective of this exercise was twofold: on the one hand, pursuing a long-term set of strategies to maximise student engagement or, more simply, to get students to do enough work every week; on the other hand, the tutors wished to test a newly available piece of software, PebblePad*, which offered to resolve a problem experienced using the Virtual Learning Environment. In previous experiments in which students were encouraged to submit portfolio material online, there was a significant reluctance to do so by more able students because of the fear of plagiarism in an open environment. The particular ePortfolio software used enables students and staff to communicate on a one to one basis.

The actual methodology for student engagement has been developed and refined over two academic years following some prior pilot work. Early in each module, students are introduced to the ePortfolio system which contains a ready prepared Webfolio template with 11 or 12 weekly sections. In each weekly section there are four or five small tasks to undertake which generally require undertaking private study and reflection upon work in the previous week or other learning activities. Contributions are limited to between 100 and 150 words per week. Once the student has submitted comments, tutors can view these pieces of evidence online and briefly respond to them. Generally, responses are quite brief and meant to reassure students they have achieved what was required or, alternatively, identify areas for further work. The weekly contributions are simply judged to be adequate or not adequate and the assessment for the 11 or 12 week period is based upon the number of adequate submissions in relation to the total. It is quite possible for students to achieve 100% on this form of assessment.

This participation concurs with social constructivist perspectives on the furtherance of learning (Wenger, 1998) which advocate that encouraging collaboration and interaction with peers, and thus exposure to alternative perspectives through an opportunity to negotiate meanings might be a beneficial method of fostering deep learning. The necessary processes of reflection, self-evaluation, and initiation of new learning (Kolb, 1984) are also likely to be triggered and emulated in such collaborative learning situations.

Evidence Based Evaluation
The tutors have extensive experience of innovating in learning, also students very clearly say when a particular innovation should be abandoned. In the current case of online portfolio submission, it is been surprising to find the vast majority of students argue that the proportion of assessment assigned to the portfolio is too low. Students are certainly ready to complain and deliver negative comments but nearly all suggest raising the proportion of assessment assigned to the portfolio rather than abandoning it. Many students recognize that the particular assessment mode did underpin a considerable amount of engagement and achievement.

Sample Positive Evidence
... did talk about progress made, for example PebblePad.
PebblePad nice way to submit working secret. Like that Jon can respond.
Feedback for the portfolio was helpful each week to know if I'm on the right track.
The PebblePad breaks up the assessments.
Feeling I have learnt something as in other modules through not knowing how work is going through not having feedback it is hard to see what you have learned.
Getting a lot of assessment out of the way early (PebblePad).
I have found PebblePad useful. Also Jon was very helpful during this module.
Getting to research the topic before lecture and presentations, using ePortfolio as it is something different, being able to do a workshop paper as a form of assessment
1. The module was clearly laid out. 2. The weekly online pebble pad was useful. 3. The topics covered so far have been interesting
The PebblePad each week made sure I actually did the reading and understood it!
Not sure how to improve it. Please make sure it is run next year for other students!

Sample Negative Evidence
Less PebblePad work, far too much work for us to do, put me under a lot of pressure due to weekly deadlines.
I found PebblePad great but too much expected each week as we were also set work from lectures.
PebblePad was a misuse of IT function, basing a whole assessment around it seemed flawed.
I think there is too many weekly tasks to do because we also have 2 essays to submit.
Struggling to find information to fit the word limit for each weekly task on ePortfolio, the location of the room other than that everything was ok (actual requirement was 150 words on a form of family diversity, e.g. lone parenthood, divorce, health impacts on families, etc.!)

Suggestions to increase the assessment weighting of the portfolio
Assessment - portfolio worth more than 20% please.
More marks of portfolio.
Portfolio with more assessment weighting.
Making PebblePad worth a greater percentage of final grade (60%).

Other Notes

PebblePad and assignment went hand in hand.

Essay seemed unnecessary after PebblePad and presentation.

Live anonymous evaluation

The tutors have also experimented with the use of wireless voting handsets for live anonymous evaluations in the most recent iteration of the third level research methods module (a compulsory module involving numerical data on which many students always struggle!) and found the following:

55% felt that the 'weekly portfolio had been useful exercise',

86% felt that the percentage assessment assigned to the portfolio 'should be raised' (from current 60% - in open discussions many students argued for 100%).

Sadly,

93% said No to whether they had 'enjoyed the module',

76% did say that they had 'learnt something on the module'.

Experiential Based Evaluation

The real litmus test of innovation in all learning and teaching should be the extent to which the opportunities provided support the learning of the whole range of students with perhaps a focus on enabling weaker students to make significant progress. In this respect, whilst it was a far from a 100% success, we believe that the portfolio method enabled tutors to better support all those students who were interested enough to make regular submissions. Where students did not make regular submissions, every attempt was made to contact these. Some of these were simply 'phantom students' whose contact details did not seem to be accurate and about whom personal tutors knew nothing. Other students seem to have quite clearly decided that they would not be undertaking this particular form of assessment and accepted that this would mean a much lower overall grade or failure of the module. The flexibility of PebblePad enabled multiple learning styles to be incorporated as part of the 'engagement' mechanism. A number of researchers have spotted the potential of learning styles to act as an agent for broader change, (Coffield, 2004). Open-ended dialogue between tutor and students may begin by identifying forms of support (e.g. study skills) and could lead on to a discussion of curriculum and assessment. If this encourages tutors to discuss among themselves how they can improve students' approaches to learning, then the door is open for course teams and continuing professional developers to use the topic of learning as a springboard for broader cultural change within the organisation.

The ePortfolio assessment has been beneficial and has solved some problems but rather than presenting a complete solution it has enabled us to make a little progress such that we may now better understand the challenges students face. For example, previously, many managers talked about student 'commitments'. What PebblePad work has demonstrated is that it is not simply a matter of missing classes because of timetable clashes with care or work obligations but there are many much more complex factors relating to engagement in learning. In reflecting upon both the tutoring and evaluations, the authors believe that we can begin to sketch out some of a wider variety of issues which the impact upon student engagement and achievement.

a) Mixed ability teaching. This often means that material has repeated for less able students to the exasperation of more able students. The issue of mixed abilities is not (simply) one of intellectual competence. Whilst there may be simply less able students, there may well be a variety of international students who might be very capable indeed but faced formidable language problems. A range of students with different kinds of disabilities including sight impairment and hearing impairment and as well as dyslexia (this also means a wide range of signers and note takers and student helpers who may significantly impact upon the teaching method), and a range of mental health issues, including disruptive students who can be a great challenge to manage.

b) Attendance. For a variety of either 'good' or 'bad' reasons students may struggle to attend regularly. This means that some of the key issues, themes and information often have to be repeated for students, who for example, turn up in the third week of a four-week block or even in week eight of a 12 week block. This, again, can demotivate students who have attended well. Factors influencing attendance certainly include caring responsibilities, paid employment, religious obligations, health issues, unanticipated accidents and domestic crises, and frequently timetable clashes within the institution.

c) **Effectiveness of Learning.** Even amongst those students who do attend regularly, there may be a wide range of levels of engagement. Whilst some students may listen effectively and understand immediately, many students may need to 'receive' the same message many times until they realise that it is of significance. In the same vein, many students do not necessarily participate in classroom activities or engage in preparatory work or indeed take part in online tasks in the class. Whilst there may be an emerging debate about the descriptive accuracy and usefulness of a variety of typologies around learning styles, it is quite clear that some students learn in different ways, learn different things, and certainly learn at different speeds. Again, this can mean that key elements of the module might need to be repeated.

d) **Technological competence and interface responsiveness.** Whilst there is a considerable debate about digital immigrants and digital natives, it is simply not adequate to assume that all incoming students will be familiar with windows-like environments nor that they can navigate around complex interfaces. It is surely the case that all tutors now realise that many students do not use word processing or other basic applications effectively in terms of realising the range of facilities available.

e) **The rapidly changing nature of student cohorts.** Whilst many academics enjoy the challenge of new groups of students each year, there is a tendency to regard students as being similar in terms of qualifications, ages, culture except. More and more UK commentators are beginning to recognise that the nature of our student intakes, and especially their attitudes in response to financial issues, has been changing in recent years and is likely to change in the future. In a recent piece of experimental work with a broadcast lecturing system, one of the authors distributed free headsets to 200 students and was bemused to find that several students regarded the 'gift' of even a rather fragile headset as of great significance in terms of the 'value for fees'.

f) **Training rather than Learning.** Reviewing the evaluations and tutor experiences suggests that many students in higher education may prefer to engage in training rather than learning. I have been struck that a significant stream of students on PebblePad who almost completely refused to reflect upon their own learning and seem to find the whole suggestion that they should have opinions about things as weird. This equally applies to overseas and ethnic minority students as it does to native-born white English students. It may be part of the 'I want it and I want it now' approach to passing modules rather than studying the subject.

g) **Hours spent by students in learning.** One of the authors has also engaged in experiments in using interactive voting handsets around the amount of time students spend on their learning. Like most institutions, Wolverhampton University assumes a notional 40 hour working week across a set of 4 modules. The student who would claim to be working at this level is, to say the least, a rarity! Using anonymous voting handset, there seems to be a clear belief that they should not have to work anything like a 40 hour week and indeed the average is normally less than half of this.

Next Steps
Firstly, and on the basis of student suggestions and requests, experimenting with raising the proportion of assessment assigned to the weekly portfolio to 75% and perhaps 100%.

Secondly, to move from awarding marks to the act of an acceptable submission to grading each submission individually. This will again represent a significant burden upon tutors but we have come across students who seem to believe that the fact that their contributions were acceptable means that they were somehow of equal value and equally relevant. This kind of assessment methodology does represent a significant tutor burden but there are some steps we have taken to ameliorate this. As the weight of assessment on the portfolio rises, so we have made other assessment tasks much simpler and easier to mark. The other thing to do is to find ways of responding to student contributions in a quick, timely, and efficient manner. Currently one tutor manually types into a response comment box whilst the other tutor uses speech to text (Dragon naturally speaking version 9) to dictate his comments directly into the comment box.

Gibson (1995) claims that the real promise of these computer mediated communication tools for learning is to enable "connection to other learners and to resources within a potentially rich, discursive learning environment" (p. 8). Within the context of this activity the tutor is the student is the tutor. It would seem that online learning offers a greater variety of people whom are in many different situations, the opportunity to proceed in HE, perhaps also offering a chance of performance improvement to a selection of individuals. Brace-Govan and Clulow (2001) conducted a study comparing face-to-face with online based activity, from a learner's perspective. Students were interviewed by telephone to measure their views about online learning.

The students' responses proved to be overwhelmingly positive and often enthusiastic about the amount of flexibility offered by remote participation, something they considered to be important in view of the other commitments they had, for example, work. Relationships can also be fostered within the context of an online environment and as such provide a powerful medium particularly for part time work-based students who find the erratic attendance patterns and study difficult, O'Donoghue and Singh (2001).

The traditional boundaries between the roles, responsibilities, and activities of teachers and learners were blurred, if not eliminated entirely within the context of PebblePad. Therefore open and direct questions were put into the system in a form of active engagement. This active engagement involved bringing one's experience to learning, being willing to expand one's understanding, integrating new perspectives into one's thinking, and applying that changed thinking to one's own perspective.

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* PebblePad is an innovative ePortfolio system designed to support any learner; learning at any level. PebblePad allows users to build and present a diverse collection of items related to their studies, personal development, continuing professional development or any event of personal significance.

Network Learning – An outline specification for the creation of a learning environment[8]

John O'Donoghue
Liz Fleetham
Colin Dalziel
Steve Molyneux

WOLF (WOLVERHAMPTON ONLINE LEARNING FRAMEWORK)

A SPECIFICATION FOR THE SETTING UP OF A LEARNING ENVIRONMENT.

The rationale for the creation of an online learning infrastructure is clearly multi-faceted. Infrastructure suggests connections, detail and possibly a fixed topology, but is this reasonable within the context of teaching and learning?

The infrastructure within Wolverhampton is complex. It has a large estate with multi campus cultures and traditions. The delivery mechanisms are based on a modular approach, often with multiple iterations, and there is a high percentage of mature and part-time students. Consistency of approach to delivery is paramount, but very few flexible learning environments existed. It was from this premise that our bespoke solution, WOLF, was developed – answering a need to embark upon a radical appraisal of all learning and teaching aspects.

WOLF is primarily designed to SUPPORT existing delivery mechanisms and not replace them. It is for this reason that the configuration of WOLF is primarily for on site use. This is particularly important when high bandwidth materials such as video and audio streaming are used.
The availability of technological environments within the University enabled rapid progress to be made, i.e. multi-site delivery required streaming media, which used the fast broadband campus technology already in existence.

The major concerns locally were the nature of existing legacy systems within the University and their interaction with any new major application or technology. Whilst student administration was not considered to be the major driver, the consequences of ad hoc imports from student records, finance and personnel would have been a severe impediment to progress. The task group at Wolverhampton considered that the major driver for a learner supported technology environment must be within the pedagogy, not driven by the technology, although the hardware platform was assumed to be available and at the required level of interactivity.

At the simplest level we needed to consider the process model, adapted from a previous model developed at the ALT Conference 1999.
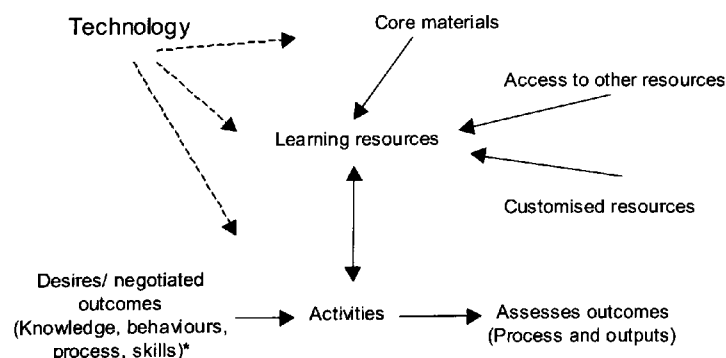
* this is the first issue with both staff and students. The activities are then developed as a consequence of the outcomes. Learning resource development does not start with the technology.

[8] O'DONOGHUE, J., DALZIEL, C., FLEETHAM, L., AND MOLYNEUX, S. (2000) Network Learning – An Outline Specification for the Creation of a Learning Environment. University of Lancaster Publications. ISBN 0902831 38 0. Pp. 269-279.

Higher education, like other sectors of society, has undergone a technological revolution. Today's students often arrive at college or university with considerable experience of computer use. As well as the university library, they want access to the resources of the Internet and World Wide Web. They communicate using email, electronic chat rooms and personal Web pages. They are expected to word process their assignments and may well be familiar with spreadsheets, databases, desk top publishing and presentation software, either from school or from work experience. Rising participation in higher education, especially among non-traditional students, has placed a new emphasis on individual needs and learning styles at a time when classes are actually growing larger.

In line with these changes and expectations Wolverhampton, via a research project called BroadNet (an advanced technology infrastructure to support SMEs in the black country), identified the ability and opportunity to utilise this same platform to deliver training, learning and teaching to the core BroadNet members (SMEs) and the wider University. The initial developments were focused on learners studying largely in isolation, with off site delivery of material via a web browser. Initially, interaction between tutors and students was limited to bulletin board systems. As it developed, academic staff were encouraged to suggest facilities for the environment which they felt would enhance the learning experience for students. The main driver, pedagogy and learning, has already been espoused, but is based on the need to create a shift away from the 'transmission' model of lecture-based courses to one where students take greater responsibility for their learning, i.e. independent, self-directed learning. However, lectures do have a role in motivating students and maintaining a sense of common purpose, and increasingly, lecturers are deploying student-centred activities that encourage them to reflect on the lecture content and provide the opportunity to refresh their concentration.

ONLINE LEARNING
Implementing an online learning environment should not be a daunting challenge. However, the planning process for a full-scale implementation involved not only decisions about technology and infrastructure, but financial models, curriculum design and assessment, all of which required lengthy reviews and input. Technology based learning is NOT just putting the lecturer in the machines. Learning is about retention – we needed robust mental models and the infrastructure to support such models.

Too many IT based learning systems focused on the technology being able to do 'clever' things! Whilst this was a requirement, it was an assumption for WOLF, and a basic tenet for developing a bespoke platform. We were clear within Schools that the simple transfer of teaching and learning to a computer in a form already used in the classroom, which then expected magical improvements in learning, could only engender disappointment at the results.

TEACHING AND LEARNING STRATEGIES
The emphasis within WOLF is on developing online support, independent motivation and active facilitation NOT wholesale replacement of academic input. Biggs and Telfer (1987) suggest that the following kinds of teaching foster deep approaches:
- an appropriate motivational context
- a high degree of learning activity
- interaction with others, both peers and teachers
- and a well-structured knowledge base.

This is further reinforced by Laurillard (1993) who suggests a number of key aspects of learning that can be used in any discussion about teaching strategies. These aspects are:

APPREHENDING STRUCTURE. Students construct meaning as they read, listen, act and reflect on the subject content. However, as Laurillard points out "Meaning is given through structure"(p51) and it is therefore essential that students are able to interpret the structure of any discourse before they can construct the meaning that we have previously seen to be so crucial to understanding. Students adopting the surface approach to learning would fail to do this, as they focus on memorising a number of phrases and points for later reproduction.

INTEGRATING PARTS. Students need to be able to integrate the signs of knowledge such as language, symbols and diagrams with what is signified by them.

ACTING ON THE WORLD. There are few teachers who attempt to teach without asking students to do something, whether it be laboratory sessions or essay writing. Students are asked to engage in some form of activity which, when integrated with other activities, assist in understanding of content.

USING FEEDBACK. Actions such as those mentioned above are futile for student learning, unless feedback on individual actions is available.

REFLECTING ON GOALS-ACTION-FEEDBACK. Learners interpret and understand reality as they make links between each of the above aspects by reflecting on the goals of learning, actions taken, and the results of those actions.

It was on this basis that WOLF has developed, 'it' assumed the student to be a reflective learner (Kolb cycle) and the emphasis with the technology is on facilitating the movement around the cycle. The development was based on identified and future, perceived and anticipated needs of all the potential WOLF community – developers, students and those responsible for the infrastructure.

ICT Project
WOLF Functional Specification

WOLF Features	Teaching Materials	Tutoring & Mentoring	Learning Support	User Tools	Tutor Admin	System Requirements
Overview	Course Structured Course Materials	Tools Communication & Collaboration	Search Learning Support Facilities	My Folder Module Related Tools	Tutor Module Administration	● For Developers ● For Users ● Infrastructure Implications
Summary of features	.course notes .presentations .case studies .activities	.calculator .chat & forum .email tutor .events/notices .references	.content .library .email .phone	.bookmarks .check progress .notepad .personal diary .email	Tools for: .scheduling events .tracking progress .structuring module	
Feature Functionality						Enhancements
Technical Functionality						Developments

Wolf Guide → Developer / Trainer / Support Staff / User

The last 2 rows are currently being developed and will feature as a separate entity

GENERAL COURSE CONTENT
Teaching Materials are displayed in the main frame of the screen to form the basic structure of reference material for a module. The module notes are typically arranged in a hierarchical structure with levels of module, units, sections, subsections and pages. Tools have been developed to semi-automate converting existing word processed documents into WOLF HTML pages. These tools help to speed up the creation of WOLF modules to enable academics to focus on the pedagogy.
The inclusion of other media such as images, video, sound and animation within the notes is possible in WOLF, adding topical interest to a screen of text.

CASE STUDIES, PRESENTATIONS AND ACTIVITIES
Case studies, real or fictitious, may be used to illustrate key topics. With the wealth of material available via the Internet, embedding links to reliable external sites can make the latest information pertinent to particular cases easily accessible from within the learning environment. Presentations consist of a sequence of screens, effectively a slide-show of material. The student has controls to proceed through the slide-show at their own speed. Presentations may include a voice-over soundtrack to complement the content.

Using presentations can be an effective accompaniment to text based Notes, a useful recap of lecture presentations, or a complement to certain aspects of the material which require more detailed presentation. Activities provide a way for the student to assess their own understanding of course material. A number of formats are possible, including model answer, multiple choice, fill in the blank and true/false questions. On submitting their answers, the students receive immediate on-screen feedback in the form of suggested or correct answers, from which they may ascertain their progress within the material.
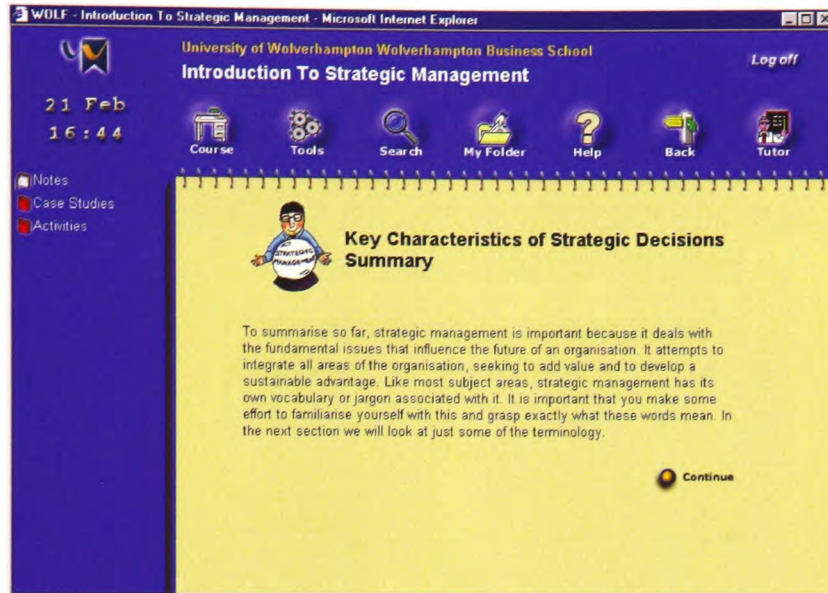

The Standard Wolf Interface. The facilities across the top of the screen are common to all modules. The Course Notes, Case Studies and Activities are specific to the module.

TUTORING AND MENTORING COMMUNICATION TOOLS

The WOLF interface is designed to be much more than a delivery mechanism for distributing course notes to students. There are a range of tools built into the system to allow students to get the maximum benefit from the online learning environment through communication, collaboration and the posting of module-specific notices and events. A key part of any learning program is discussion of topics in the subject area. Whether the discussion takes place in a tutorial, over coffee or over the Internet, students should be encouraged to debate key areas of their subject.

To facilitate discussion several communication features have been incorporated into the WOLF learning environment:

- Forum
- Chat
- Pager
- E-mail Tutor
- E-mail Class
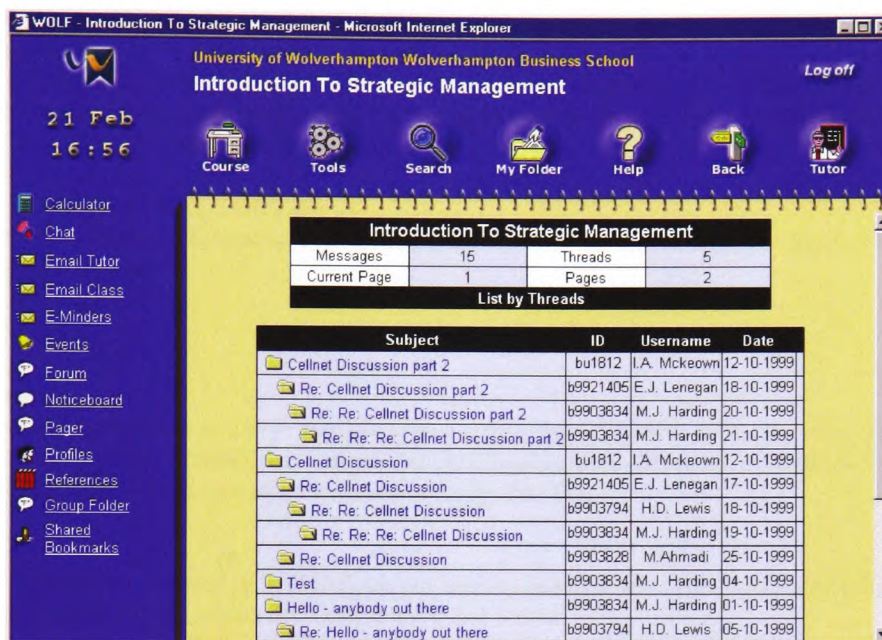
Clicking on the Tools option lists the available facilities. When selected the tools appear in either the main window or in a separate pop-up window.

Forum

To enable discussion, the Forum allows students and staff to send messages which can be read by anyone with access to the module.

Forum users may respond to existing messages or create entirely new topics for discussion - in this way the discussion evolves. Students can join in with the Forum discussions at any point in time.

Messages remain in the Forum until an administrator removes them. With tutors monitoring the discussion, debate can be guided to keep subjects relevant to the module's progression.

Chat

Chat creates a live 'virtual' meeting. When a user logs into Chat they see messages from other users seconds after they are typed and sent. Chat messages are listed in order, the last message sent appearing at the top of the list. Messages can be sent to all users or just to a participant selected by name. Additional Chat areas can be created during a session, enabling small groups of participants to move from the main Chat area to a topic specific Chat area.

Chat is 'live' in nature, so messages are not saved - as soon as a user leaves the Chat area all messages are lost from their view.

Pager

The pager facility enables anyone logged into the system to send a text message to another user. The message will appear on the recipient's screen in a pop-up window. The pager is an ideal tool for tutors to contact students with informal messages and can be used to good effect to set up a live chat session.

E-mail Tutor

This tool enables students to e-mail a module tutor from within the learning environment. The user and the tutor's e-mail addresses are automatically inserted and a default title is included. If there is more than one tutor involved in the course the user may select the correct tutor from a drop down list.

If the student is involved in group work there are facilities to enable them to copy ('CC' or 'BCC') the email message to other group members and the tutor.

E-mail Class
This option has been created to allow global emailing of the entire class.

Group Folder
The Group Folder is designed to be a repository for materials for the group. Both students and tutors can upload and download files within the Group Folder area. Materials uploaded can only be removed by the person who uploaded them or a tutor. Generally tutors use the facility to distribute notes, case studies and other printed materials.

Shared Bookmarks
The Shared Bookmarks facility enables anyone to upload a web page reference. When a new link is added, the originators name is listed next to the link. This ensures that credit is given to the person who has found the resource and that only suitable links are added.

MODULE INFORMATION TOOLS
To convey module related information to students, three features have been incorporated into WOLF:
- Events Calendar
- Noticeboard
- E-Minders

Events Calendar
The Events Calendar appears in a new window with a single month in view. It displays date specific information relating to the module, e.g. assignment deadlines, tutorial dates, and scheduled examination dates. Selecting a highlighted date shows event details for that date.

Noticeboard
This area is intended for general notices that are not time or date specific. The Noticeboard function displays a list of notice titles, which are links to each full notice.
The Noticeboard is administered by course tutors.

E-Minders
The tutor can use this function to remind students of specific events or important activities. Students are also able to create these, which are effectively scheduled emails.

REFERENCES
The references section is used to store information on relevant texts, web links and other materials such as videos and CD-ROMs. Each type of reference media is stored in a separate subsection with list items defined by course tutors. Each reference includes a short abstract.

CALCULATOR
A standard calculator with a full set of scientific functions is included in the learning environment should calculator functions be required by students for any module.

LEARNING SUPPORT – SEARCH OPTIONS
The strength of the WOLF platform is the range of resource facilities which are built into the environment. With options to search various online resources at the University of Wolverhampton, students can access resources to support their studies without having to leave the learning environment. The Search menu provides the user with the following options for learning support:
- University Library
- Staff/Student Email
- Staff Phonebook
- Who's Here

The Library search has a direct link to the OPAC system which, amongst other things, enables students to locate material held by the library. Linking directly to the University's website, students can search the student database for e-mail addresses or the staff database for tutor e-mail addresses and daytime phone numbers. Who's Here simply informs you who else is currently online in that module.

USER SUPPORT

Each student using WOLF has access to a number of tools which store customised information to help them through their studies. The information is held centrally in an individual student profile section on the WOLF server. Students can therefore log in to WOLF from any computer and still have access to their own specific information. The following support tools are accessible from the My Folder menu:

- Bookmarks
- Check Progress
- Notepad
- Personal Diary
- Email
- To Do

Bookmarks

This allows students to electronically bookmark a page that they have found useful or significant. The Bookmarks remain in the list until the student deletes them.

Check Progress

As students work through the course, a file is created which logs their access to the material. Both students and tutors may view this file via the Check Progress option. Each page is listed, with a marker indicating how many times they have viewed the individual pages. There is also a percentage rating to indicate how much of the course material has been viewed.
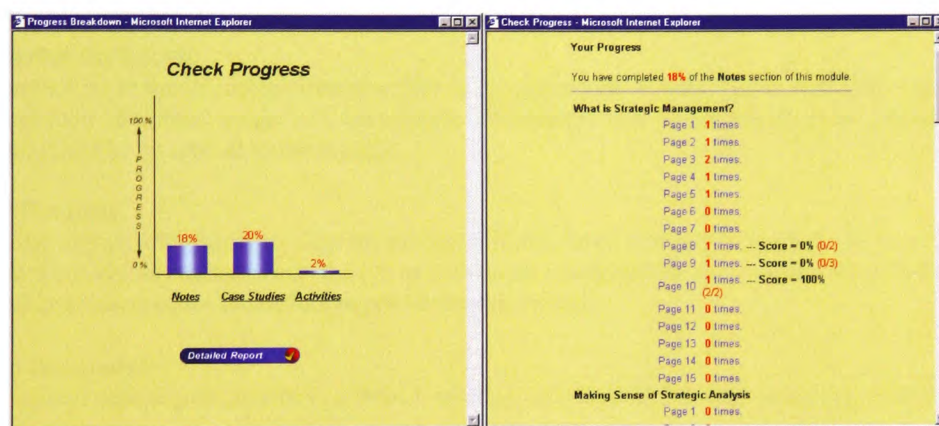
Students can check their progress through the material, initially via a simple graph or if more information is required a detailed list can be viewed.

Notepad

The Notepad is a simple text editor that enables students to type and save notes about material as they work. Students can copy and paste text into the notepad from the content using standard keyboard shortcuts, and annotate around these excerpts for context, if they wish.

Personal Diary

This is a personal version of the Events Calendar and is accessible by the student from all WOLF modules. Users enter their own information into the diary which remains completely private.

Email

The e-mail tool allows the user to access their University e-mail account held on the University mail server. E-mail messages are retained on the mail server, so students can retrieve the message more than once, from different computers.

To Do

This is a basic 'to do' list which allows students to prioritise their workload by level of importance. It can be viewed by the student from any WOLF module.

TUTOR ADMINISTRATION

The tutor administration tools enable course tutors to tailor and manage the functionality of the WOLF learning environment specifically for their module. These administration tools are only available if the user logging in to WOLF is registered as a Tutor on a module by the main module administrator (who is assigned when the module is created).

Managing Course Information

The WOLF learning environment provides students with several course information features in the Tools menu. The tools to manage these are provided for tutors:

- Events
- Notices
- References

The Events calendar facility enables tutors to add, remove or update entries in the Events section of the Tools menu available to students.

The Noticeboard option enables tutors to add new messages to the Noticeboard. Features included are options to update existing notices and delete those which are no longer required.

The References administration tool enables tutors to add, remove and update the References for the module. The update includes text based references and Internet web link references. There are options to include extracts from references, and outline details of website content.

Administering the Forum

The Forum tool gives tutors administration access to the discussion Forum. Tutors can delete messages according to their date, their sender or their content. This feature may be used to keep the threads of discussion in the Forum topical to the module.

Tracking Progress

The Tracking tool enables tutors to view the progress of registered students through the online material. Tutors select individual students from the list to see the percentage of the total content that each student has viewed and how many times individual pages have been visited.

Setting up the module

The creation and ordering of content in a WOLF module is defined by the tutor using two administration tools:

- Menu
- Navigation

The menu function is used to create and change the index list of pages in a module. Tutors can update the file to include new pages of content (Notes, Activities, Case Studies or Presentations) or delete old pages as required. There is also the option to set up new sections and subsections. In a similar way to the Menu function, the Navigation tool lets tutors define the sequence in which the pages are shown. This controls the flow of the module's content.

Configuring the WOLF Interface

Some tutors may choose not to have all the functions of the WOLF interface available to students. The Configuration tool enables tutors to select which options are available within their own module via a check box list. The default option is for all facilities to be available.

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Development of a support environment for first year students taking materials science/engineering[9]

Tahar Laoui
John O'Donoghue

This paper is based on the experience acquired in teaching materials science/engineering to first year university students. It has been observed that students struggle with some of the fundamental materials concepts addressed in the module/course. This applies to delivered lectures but extends to the incorporation of tutorial sessions provided after lectures. Moreover, when students miss a lecture or seminar the acquisition and application of knowledge and concepts becomes problematic. Consequently, or perhaps inevitably, these students perform poorly in their assessments and their motivation for the subject suffers. A careful analysis of this situation and of the nature of interaction and engagement was performed to gain an insight into the reasons for this lack of performance. A common factor is that students do not dedicate sufficient time for reading and consolidation using the chapters/sections prescribed after each topic. They also do not attempt solving tutorial problems outside the formal contact hours. This reflection and personal evaluation is difficult to administer, resource intensive and yet potentially enables each student to monitor and evaluate their own learning and understanding. A multimedia learning technology-based environment was created in which students could engage. This was located within the University of Wolverhampton Virtual Learning Environment (VLE) called WOLF. The students were able to progress independently but with access to tutor and peer support, help and advice. The use of non-text animations and structures was used and seen as fundamental by the students in enhancing the taught course and in developing a deeper understanding of complex atomic and crystal structures.

Keywords: multimedia learning technology-based environment; virtual learning environment

Project description
Reason for undertaking this project

The evaluation is based on the content and delivery of a 'Materials technology' module which first year undergraduate students engage with. This is in the School of Engineering and Built Environment, University of Wolverhampton. It was observed that a number of students struggle with some of the materials' concepts given in this module. Moreover, some students miss a few lectures, creating a problem in their establishment and consolidation of the knowledge and concepts that are given in successive presentations and lectures. Consequently, these students perform poorly in their assessments and some of them even fail the module.

A careful analysis of this situation was performed to gain an insight into the reasons of this poor performance. A key reason found to be a common factor for most of the students to different extents, is that these students do not dedicate sufficient time, or even no time for some students, for reading the chapters/sections prescribed after each topic. Equally many do not attempt solving tutorial problems outside the formal contact hours. They also failed to apply the knowledge acquired from their reading into the learning and teaching environments and situations located within the subject.

Often new media simply imitates the old approach and media without recognising or capitalising on the unique characteristics of those media (McLuhan 1995). This project endeavoured to enhance the taught course and to stimulate the students via new experiences and constructions which were more visual.

Aim of the project

This aim of the project was to develop a support environment utilising technology, which would enable the students to develop their skills, acquisition and application of knowledge as well as to achieve their learning outcomes at a self-determined autonomous independent level. The desire was to achieve a much 'deeper' approach to learning (Marton and Säljö 1976), linked intrinsically to the learning outcomes of the module. Ramsden (1988) interpreted and refined this approach whereby students adopted a strategic approach to their learning, i.e., they, the students, are concerned to get the best possible grade and this may involve both a surface approach and a deep approach to learning, depending on the nature of the task. It was in this context that the development progressed.

So whilst the focus was on achieving a successful assessment outcome, the creation of the media within the VLE was targeting the understanding and application of the subject. The manipulation and experimentation allowed within the environment enabled exploratory (information acquisition) and confirmatory (knowledge construction) to be experienced and practised by the student. The opportunity for collaboration and interaction with others was made available to students 'on demand'. This has been demonstrated to benefit students who often feel 'remote' from the classroom especially when studying often complex subject content (Brookfield 1987; Schon 1988). This was supported via the VLE in both synchronous and asynchronous communication formats.

Learning outcomes

Whilst the rationale was 'remedial', reinforcing and potentially at a higher cognitive level (Bloom,1956) than what was delivered within the lectures, the objectives had to be clearly aligned with the learning outcomes. The learning outcomes of this first year materials science/technology module are:

Subject specific
• Classify engineering materials in terms of their generic groups and general fields of application based on their properties.
• Appreciate the factors controlling properties and the interrelation between properties and microstructure and how properties can be modified by changing structure.

Intellectual skills
• Apply knowledge and understanding.

Key skills
• Apply/use numbers (mathematical equations).

Method

The programme of study of 'Materials technology' has been via lectures and laboratory experiments. The outcome of this project will not completely replace these, but will enable the students to develop their skills, knowledge and achieve their learning outcomes at a self-determined independent level. Although learning through exploring problem situations is not new, problem-based learning was popularised in the 1960s as a result of research by Barrows and Tamblyn (1980), into the reasoning abilities of medical students. The ability to individualise the learning experience via a VLE approach for each student is potentially very exciting. Such technological interventions have the ability to enhance the learning of students if used appropriately They can encourage more independent and active learning as well as being an efficient means of delivering course materials (McKimm et al. 2003). This is allied to both the students' capacity to work at an individual activity based level and the member of staff being able to interface and intervene with the student at a variety of levels based on structure and progress of work.

The project will draw upon the main themes of the problem-based approach from Duch (1996).

1. An effective problem must first engage students' interest, and motivate them to probe for deeper understanding of the concepts being introduced. It should relate the subject to the real world, so that students have a stake in solving the problem.
2. Good problems require students to make decisions or judgements based on facts, information, logic and/or rationalization. Students should be required to justify all decisions and reasoning based on the principles being learned. Problems should require students to define what assumptions are needed, and why, what information is relevant, and/or what steps or procedures are required in order to solve them.
3. Cooperation from all members of the student group should be necessary in order to effectively work through a good problem. The length and complexity of the problem or case must be controlled so that students realize that a 'divide and conquer' effort will not be an effective problem-solving strategy. For example, a problem that consists of a series of straightforward 'end of chapter' questions will be divided by the group and assigned to individuals and then reassembled for the assignment submission. In this case, students end up learning less not more.
4. The initial questions in the problem should have one or more of the following characteristics so that all students in the groups are initially drawn into a discussion of the topic:
   • Open-ended, not limited to one correct answer.
   • Connected to previously learned knowledge.
   • Controversial issues that will elicit diverse opinions.

Detailed method

• An individual account was set up in the VLE of the university (WOLF) for all registered students taking the module 'Materials technology'.
• Lecture notes containing the power point presentations, delivered during regular weekly classes, were made available for the students via WOLF using a password specific to each student.
• Animations were incorporated into the lectures to visualise some phenomena related to the concepts to help student gain a better grasp and understanding.
• Students were involved in forums and discussion with their respective peers and lecturers/ tutors to discuss the effectiveness of this innovative approach to teaching and learning.

Examples of the animated materials

The first part of this VLE tool addresses the concepts related to the description of the atomic model structure, atomic bonding, crystal structure and imperfection in solids. Figure 1 displays a couple of snap shots obtained at different stages of this VLE tool showing a 3D animated atomic model with three energy shells providing explanations in form of windows containing additional information. By clicking inside the model, the internal 'nucleus structure' opens up revealing the protons and neutrons.
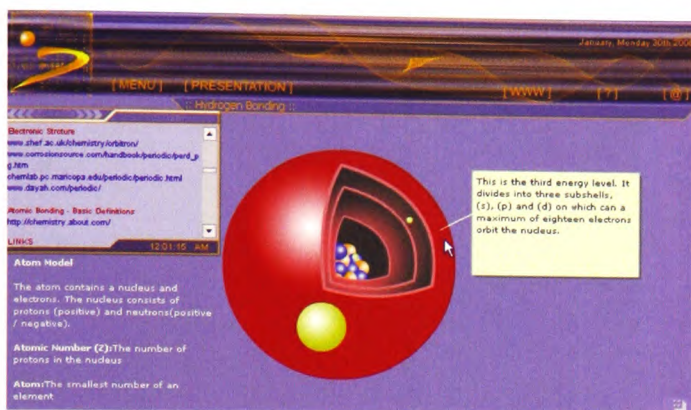

Figure 1. A 3D animated atomic model shown with three energy shells/ levels providing explanations in the form of windows containing additional information.
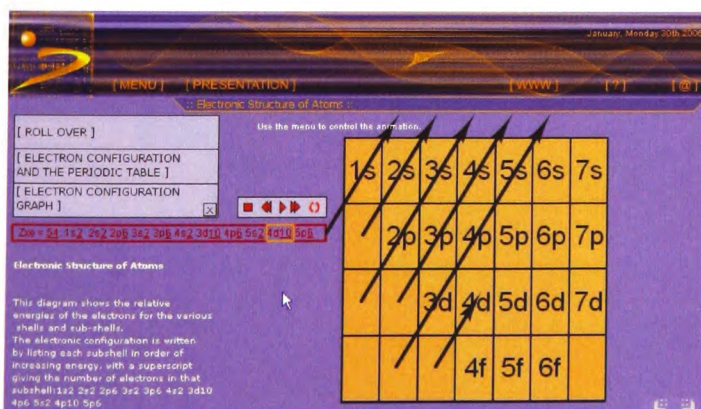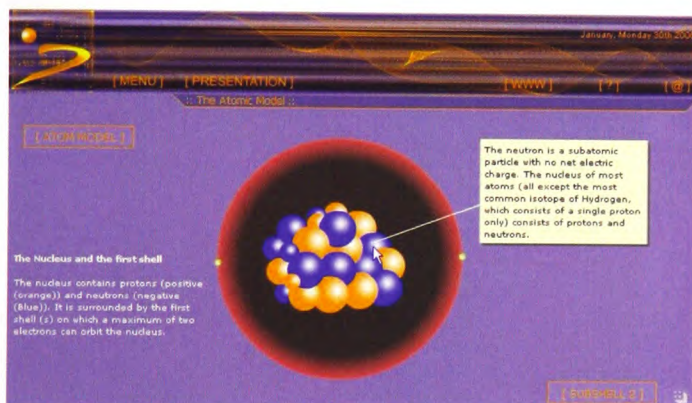
Figure 2. An animated screen allowing the student to position correctly the electrons around an atom (example of Xenon is displayed).

The tool contains several windows including (menu) giving access to all individual screens, (presentation) allowing the display of the first screen showing the 3D animated atom model, (www) providing links to relevant websites for additional reading. The periodic table is also well addressed in the VLE indicating how the elements are positioned in the table as well as how to determine correctly the electronic structure of any atom by putting the electrons in their proper energy levels (Figure 2).

Figure 3 displays simulated 2D and 3D models containing an imperfection (an edge dislocation) with animation to show the movement of the extra half plane due to applied shear stress and the associated local regions under tension and compression.
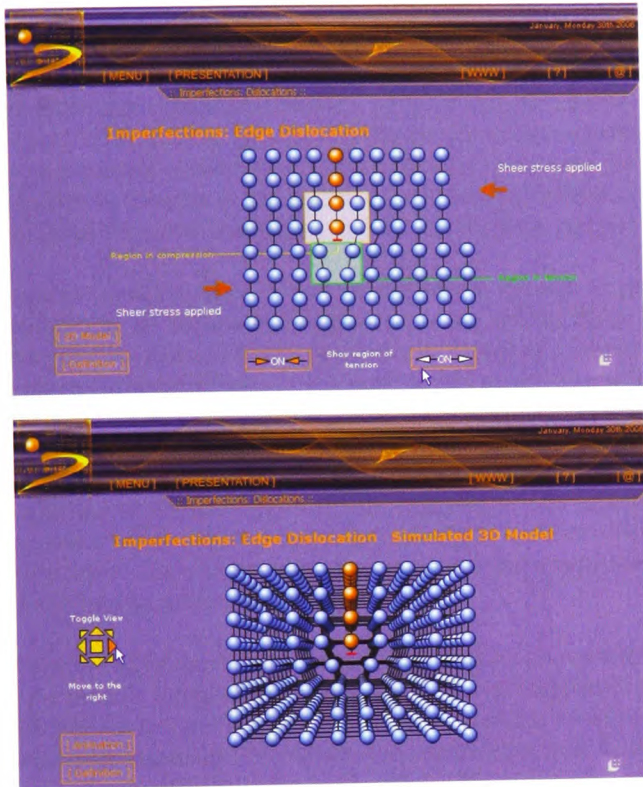

Figure 3. A simulated 2D and 3D model containing an imperfection (an edge dislocation) with animation to show the movement of the extra half plane due to the applied shear stress.

Evaluation strategy

The project impact was initially evaluated via student discussion in the computer lab connected with WOLF when the module was delivered in 2005 and 2006. Students were involved in forums and discussion with their respective peers and lecturer to discuss the effectiveness of this innovative approach to teaching and learning. The students were very excited and showed considerable enthusiasm. Whilst appreciating that some of this enthusiasm may be due to the novelty effect, or 'Hawthorne' effect, the use of a multimedia approach was both thought provoking for the students and established concepts and structures at a much deeper level of understanding.

In mapping the activity to Saljo's (1982) distinct conception of learning, the lectures and seminars clearly addressed the first three levels. Via the VLE development, this acquisition and application of knowledge was extended into Saljo's Levels 4 and 5 (abstraction and interpretation). This was enabled via the animation and simulation provided by the media, i.e., a new learning environment enables an insight into the subject, which can then be transferred across and between other domains. Again, as already intimated, the engagement was targeted at what Bloom (1956) calls the analysis, synthesis and evaluation phases of cognitive development. Holistically the lectures provided an introduction, extended into the supporting VLE, and then further extrapolation by the students. All this clearly aligned to the learning outcomes

Further evaluation from students was gathered through an anonymous online questionnaire, which was available for all the students registered on the module 2006. This was developed and delivered via Surveyor[1] Software. The questionnaire consisted of 15 questions including both closed and open-ended questions in order to furnish quantitative and qualitative data. Six questions were used to ascertain the extent, nature and reach of the use of the multimedia content of the VLE in supporting, extending and reinforcing understanding of the more formal lecture materials and complex theories. There were three questions aimed at understanding the students' engagement with the content and their increase in motivation as a consequence of both engagement and understanding. Finally, there were seven open questions, which asked about transferability of understanding, use in other areas, positive and negative issues, areas that might require improvement, and suggestions for additional functionality. The questions are outlined in Appendix 1.

The group of respondents numbered 25. Whilst as a representative sample of students this is small, in terms of the module it represents a 75% return. The evaluation demonstrated a significant appreciation and a welcome for using this mode of study, i.e., lectures further supported and enhanced by alternative online media approaches which students can study and engage with remotely and at their own pace. Certainly despite the fact that this was a pilot study, the authors felt sufficiently supported to develop the model further. The overwhelming percentage of students felt that they understood the concept of atomic structure as a consequence of the animations within the VLE:

...that this type of approach be implemented to other subjects so students can gather a better understanding of the lecture from another perspective in a less complicated view.

... the main strength of the VLE project is that I can review the stuff covered in lectures and the parts I didn't understand so well I can go through them at my own pace.

At this stage of the pilot, and also due to the low number of student participants, it was felt that qualitative appraisal was of more value than quantitative values. However we enclose the qualitative reasons received as well as the free text responses (Appendix 2).

All the students who submitted responses felt that their understanding of the concepts related to the materials covered in the lectures had improved as a direct consequence of the VLE. What was most interesting is that a significant number of students would welcome additional formative assessment as part of the VLE project to test their understanding at each stage, i.e.:

... more self-assessment questions would be appreciated to gauge yourself on how much you understand the concepts or short tutorial questions with solutions given at the end.

... to improve, I think if tutorial questions were to be increased, with solutions given at the end, it would help the students to self assess themselves.

An attempt was made to elicit the students' perceptions of the nature and the value of their engagement and understanding of the VLE content. In particular, did the engagement foster a deeper approach to study (Prosser and Trigwell 1999)? This is difficult to assess in such a small study. Certainly the understanding and application of the concepts and structures in other domains will be assessed via other modules and against groups hitherto not exposed to this project. The use of staff developers was invaluable to this project as the skills required to create the animations were significant. This can be addressed by an institutional policy and development infrastructures which support staff and informs what is considered effective use of technology in learning and teaching (Moron-Garcia 2006; Kent 2003). The best model appears to combine technology enhanced learning including the animations, discussions and debate with the more traditional methods (Wheeler, Frawley and Davis 2000). It would appear that embedding extrinsic motivators such as requiring students to assess eLearning through tracking or assessment strategies can lead to the more intrinsic rewards of learning for learning's own sake and to students feeling involved and taking responsibility for their own learning (Davies and Smith 2006; Canaan 2003).

Future work/development

It is planned to develop a flowchart centred around a simulation, with multiple routes, through which the student can traverse. It will include video footage of experimentation, e.g., tensile testing as well as animations exploring what is physically/conceptually happening at various stages. Students can be directed to physically conduct experiments as well as visualise what is taking place via the VLE. At various stages, there will be an opportunity for formative assessment to assess what the students have engaged in and what has been learnt as a consequence. This will be based on the learned concepts through the given lectures/practical sessions and the requested background reading. In addition to individual pathways, students will be able to become involved in forums and discussion with their respective peers and tutors.

Acknowledgments

Notes

1. Surveyor is a web-based application from Object Planet.

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Appendix 1. VLE Project Questionnaire delivered online via Surveyor Software

Disagree/agree/strongly agree

1. As a consequence of using the VLE project your understanding of the concepts related to the materials covered in the lectures has improved.
2. My knowledge of atomic structure and bonding, crystal structure and phase diagrams has improved due to the VLE project.
3. The use of a multimedia approach to this material helped me to understand the concepts addressed within the topics.
4. Would you consider this approach using multimedia a positive approach?
5. Has the use of the VLE project increased your motivation for further learning within the subject.
6. The opportunity for self paced study was most useful, where time and place of study were not restricted.

Yes/no

1. Having used the VLE project, do you now feel able to apply some of the concepts to other areas of the subject/ award and other related modules?
2. Would you like to see other subjects/ topics using this approach?

Free text

1. What are your thoughts about the format of the VLE project ...?
2. What are your thoughts about studying using online material ...?
3. Things that I have learnt ...?
4. Things that I'd like to have spent more time on ...?
5. The strengths of the VLE project have been ...?
6. Suggestions for improving the VLE project ...?
7. Any other comments ...?

Appendix 2 included a summary of the questionnaire results

Technology in Education - A Study into the Effects of Information Technology in Education.[10]

John O'Donoghue
Gurmak Singh
Sharon Caswell

ABSTRACT

With the continued advances in information technology and associated communication comes the interconnectivity of all businesses and all industries. Either by default or association, the traditional education system will also be affected. The information age has encouraged the ubiquity of a seemingly endless supply of information that is there just waiting to be absorbed by students that have the ability and the inclination to interrogate the vast range of information systems available. There is an inherent problem with this in the management of the information, but that is outside the domain of this paper.

Many research articles suggest that all facets of education will change, virtual education, online teaching, global universities, demise of traditional teaching methods are just some of the terms used to describe this euphoria. New models of teaching and learning are emerging, driven by accessible new media. The role of the Teacher and Trainer is becoming one of a facilitator of learning discovery.

This paper will consider if the ever-increasing presence of technology and information will help or hinder the education process in the 21st Century. In addition it will explore the possible impact on the predominant components of the system, which create the pedagogic environment we know today - the students and the lecturers.

Keywords: Information Age, virtual classrooms, tele-tutoring, technology mediated learning, global school house, World Information Order, telematics.

1.0 INTRODUCTION

Virtual reality has the potential to change the way individuals learn (Pantelidus and Auld, 1995). If current research articles are to be believed, this is an understatement since the technological revolution is fast changing, not only the way society learns but also the way the world communicates, conducts business, and even carries out day to day activities. With 62 million users of the Internet in the USA alone, statistics like this make it the fastest growing technological revolution in history (Hosie and Mazzarol, 1999). The possibilities for improving educational practices using the Internet seem to be boundless (Joo, 1999). Higher education institutions are seeking innovative ways to provide flexible courses through new media (Barnard, 1997). The possible era of a truly inter-connected global school house (Knight, 1996) is no longer considered extreme in the age of technology mediated learning and the transmission of information at the touch of a button.

However, many such as, Hutchison, (1998), fears that institutions are rushing into this technological dimension too quickly. He warns that there is a need to think carefully about the implications of technology on society.

> 'All aspects must be deliberated to ensure that we get the idea of virtual universities right in order to envelope the rapid expansion of the university sector and the ever growing dependence and recognition of formal qualifications.'

Morrison (1999) shares this fear and debates whether something essential to higher education is being sacrificed when college and university courses take place online rather than on-campus. Examples that have been frequently researched are the effect on emotional attributes of students as a result of a lack of in face-to-face integration. Whilst the change predicted is so transformational, damage may be inevitable, but according to these writers, the impact of IT on education must not be detrimental to the education process.

This paper considers the impact of IT and how it is changing the traditional classroom. It explores the differences in the traditional classroom structure and the virtual university. To date, the success of the virtual university can only be based on research on distance learning where students work individually and tutorial support is limited. With the epoch of collaborative learning, virtual universities however, promise to be more interactive. Classroom teaching and distance learning are converging on a new educational approach (Westera, 1999). However, the consequences of a more intense IT experience may be more a hindrance to the education process with possible detrimental impacts to the quality of learning students receive through lack of interaction.

The first section analyses and summarises the impact of IT on the main areas of the education institutions, management, students and finally impact on society.

2.0 THE CHANGE IN UNIVERSITY ORGANISATIONAL STRUCTURE

The information technology environment is dynamic and fast changing which suggests changes in current university organisation structures which maybe more transformational than incremental. Schuler (1997) believes that it is the end of an era for university campuses as they are currently known identifying a change in the traditional paradigm of learning. Much attention seems to have been devoted to suggestions that change in the education systems is long over due. Hardin and Ziebarth (1995) believe that traditional education is evolutionary rather than revolutionary and Thomas (1986) supports this and adds that up until now, educational institutions have been "moving in the same steps with which it and society are familiar and comfortable, while the rhythm changes". He further states that education relies on familiar paradigms for focussing processes, problems and solutions. Likewise, Westera (1999) agrees that education in the past has favoured the status quo.

Universities may have to adopt a more business-like approach to education and meet the demand of the students (Cornell, 1999). An example of this is in a New York University. It has established its own distance education venture hoping to bring in thousands of Internet based learners and in addition, thousands of dollars in profit. Hosie and Mazzarol (1999) state that IT is a potential source of competitive advantage particularly in the education industry. This is unlikely to have a profound affect on the standards of education in the short term however, there is an element of danger that hints at the possibility of education institutions becoming organisations focusing on profit based output rather than an output concerning levels of education and achievement.

There appears to be much emphasis on the use of IT in education. Hardin and Ziebarth (1995) and Schuler (1997) claim that universities cannot ignore computers and the vast selection of information available, and what is more, teachers cannot ignore them either. Because IT is removing all barriers, it should be incorporated into the running of the institutions. Universities were to be communities (Hutchison, 1998) but now the world is a much smaller place. There appears to be a danger that in an effort to adapt to the technological changes, universities may offer information to the surrounding community. Hutchison goes on to say that although well meaning and useful, this is a wasted investment and demonstrates the insular culture of education institutions. The catchment area is not just the local community, it is the world.

The structure of universities needs to change to respond to the imperatives of technological development and changing consumer demand (Kershaw, 1996), and to encompass or embrace IT. Research however, indicates that there may be resistance in meeting these changes. Hopper (1999) insists that the structural core of the traditional university contain elements that inherently discourage technology integration. Kershaw shares this opinion and states that there is an existence of territoriality among departments within university, particularly those that use IT. The use of IT by some departments is restricted and ownership is confined to one owner and jealousy guards expertise. Kershaw further suggests that the way to implement a change in both structure and attitude is to remove the focus from technology. This suggests that the change agent should be from the academic side, not technological. In order to overcome resistance, Kershaw believes the vertical organisation representative of academia combined with the job description and narrow focus should be discarded.

2.1 Funding and Staff

Funding has always been a controversial issue within education and writers seem to suggest that the advent of information technology in the system may relieve the continuous financial pressure. The need for Higher Education opportunities is increasing at the same time costs associated with public universities are being reduced ((Barnard, 1997). The crisis of funding is as evident as ever in the traditional university, as a result, Hutchison (1998) considers traditional universities are not fulfilling historical functions of transmitters of knowledge. One of the areas poorly funded are the libraries, which in fact is ironic since many resources are dissipated in the same universities where lectures and recourses are duplicated across different campuses. A solution to this problem may exist in the form of distance learning. "Distance education is a method of reining costs associated with expanding and maintaining an increasingly expensive campus infrastructure" (Barnard, 1997). This intimates that by having students learning in a location of their choice relieves the responsibilities for universities to provide suitable infrastructure. This could be criticised since this method, although may be effective, does not put the student first and the argument reverts to the educational institutions focusing on profit based output.

Further consideration and research suggests that lecturers and employees of education institutions, cannot escape a change, particularly if campuses will no longer be confined to a geographical area. Universities may no longer require established lecturers and administrative staff on the payroll. Research suggests that the information age brings the epoch of tele-working where employees work when required. Applegate et al (1994) describes cluster organisations where people work together for the length of time it takes to complete a task, for instance to produce materials for a module. As a result, universities will have the benefits of small scale and large scale simultaneously. This invites criticism from two points. Firstly, Westera (1999) is keen to impress that it remains the education institutions responsibility to monitor and warrant the quality of learning. To this end, staff may be still be needed on a permanent basis which introduces the second point. Hopper (1999) explains that a typical university may still need personnel and resources for instructional technology to support the classroom teaching in addition to a department of instructional technology to provide assistance to staff. Wilson (1996) agrees but suggests that universities will employ staff on a support basis rather than a lecturing one, facilitating the process rather than simply delivering content

There is no consensus among researchers regarding what the impact of technology on university structures will be. Much of what has being researched is based on the futuristic virtual university and has yet to be evaluated. However, the key points appear to be the problem of ownership of technology within departments. It appears that students not learning at the forefront of these departments will have a lessened education which causes some concern. It seems an inherent cultural problem is identified here. Education institutions cannot pool the resources for technology and there is also evidence of duplication of resources in institutions with different campuses. Without a more joint approach, it becomes questionable how will they solve the problem of deterioration of libraries. A library is a shared facility and requires shared resources. On the whole, findings seem to indicate that in order for the current education institutions to adjust to meet the demand of the Information Age, the process of business re-engineering needs to take place.

3.0 IMPACT ON MANAGEMENT

Research seems to indicate that the management of education institutions will undergo a change as well, (HEFCE, FEFC, NISS, JISC). Writers suggest that management will be forced to adapt their management styles to meet the change information technology will bring. However, despite the information technology necessitating a change in management techniques, management must maintain a vision of what is needed to allow students to be effective learners (Kershaw, 1996). There is a strong impetus on the management of all contemporary industries and organisations to ensure maximum return is received from employees before they leave. Campbell (1996) notes that employees develop no loyalty for their employers and quite willingly take advantage of other offers. Angell (1995) agrees and states that loyalty in the information age is on the "basis of unashamed rational self interest". This may not be the ideal attitude to adopt. Education has always and will always be based on the interest of the students and therefore management must motivate lecturers to provide a service for students they may never actually share a room with. Also, these lecturers need to be motivated enough to enable the university to receive maximum return from them. Angell goes on to point out that this in itself may prove challenging since for those operating in a virtual world, but is uncertain why would a worker be motivated to take part in an organisation that they do not physically or perhaps even socially belong to.

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With the notion that teachers must be motivated to use the IT available, encouraged by many, many centrally funded initiatives (NGfL, Learning Age, Peoples Network, NOF, UfI, etc). It follows that the impact of IT and the Internet depends on the motivation of the teachers involved (Joo, 1999), not to mention the students themselves. Hardin and Ziebarth (1995) add to this by suggesting that an increase in the collaboration among students, parents, administrators, and lecturers could benefit the education process of future generations. Ultimately, Berge (1999) states that it is the responsibility of the institution and the instructor, regardless of the media used to provide a learning environment in which the learner has the opportunity for appropriate interactions.

It is interesting to note that the mindset remains as in traditional education, in that it is still the institutions responsibility whether virtual or traditional, to provide appropriate learning environments. However, for staff that have no loyalties to the institution, there appears a danger of little continuity in teaching practices which would surely impact on the mission of providing a suitable learning environment.

4.0 THE CHANGING ROLE OF LECTURERS

With a combination of increases in student numbers, decline of the tutorial system and standardisation of the curriculum, Hutchison (1988) believes already presents lecturers with an abundance of change to adjust to. Joo (1999) believes that teachers could be removed from classrooms. There might be two possible reasons for this. Firstly, Joo believes that lecturers are no longer a major source of information to students since the materials they once used are now freely available to anyone and therefore devalued. Joo adds that attendance in classes is already reduced since students simply meet with tutors when problems arise and when a synchronous solution is required. Secondly, Hutchison (1998) in support of this view considers face-to-face lecturing little more than a filter for the learning process. He is of the opinion that lecturers who simply transfer information verbatim do not add value. Students can study and learn the curriculum with recommended textbooks.

As a result of this suggested reduction in attendance to classes distinct advantages have been identified. Firstly, Knight (1996) supposes that teachers are freed from chalk face learning and can spend virtual time with those students that need help and one-to-one tuition. Secondly, Dertouzos (1997) agrees that the freelance scholar who can teach relying on virtual technologies without timetabled attendance in given classes, could be useful in teaching illiterate adults who may experience discomfort and embarrassment in a face-to-face environment. On the other hand, Wilson (1996) believes that this one lecturer talking to fewer students must still retain the capability to interact individually with each student.

In order to advertise their services, Hutchison (1998) visualises the concept of tele-tutoring, by using online facilities. Hutchison imagines that lecturers will become 'instructional designers' and will spend increased time writing and designing courseware and web sites for dissemination though electronic means. In addition to that workload,. Robertson (1998) thinks that tutors will also take on a role not dissimilar to a trainer or coach as opposed to a taskmaster. In this way, the teachers dedication and ability is not wasted as it will still be deemed an important educational tool (Dertouzos,1997). Barnard (1997) explains that the tutors are then in a position to guide the students to specific material and libraries and therefore providing a level of guidance and direction. These arguments could be criticised for two points. Firstly, it could be perceived as manipulation of the information available and is contrary to the opinion that this method of teaching encourages a level of freedom in the students. Secondly, Westera (1999) insists that tutors will be forced into this role of coach rather than by choice since many of the students tele-tutoring will attract will be adult, highly autonomous professionals who expect a certain level of service. The result is the undermining of the traditional teacher. Berge (1997) conversely argues that this is the result of a collaborative learning environment and it is recognised that teachers have a wealth of knowledge, but students add value also. It will be implicit that there is a shared authority among teachers and students.

4.1 A change in teaching techniques

The changes in the traditional teaching techniques as envisaged by many writers may be a harsh indication of the transformation education may undergo. Perhaps, the familiar, traditional, intimate classroom may be revolutionised into a distant communication which takes place online that could ultimately be ineffective. Jones-Delcorde (1999) however, argues that for the foreseeable future, the computer is not threatening to replace the instructor. Nevertheless, despite this, he also believes that while IT stimulates creativity, it also stifles it by eliminating creative motivations. He considers the idea that computers may only be successful because they offer instant gratification. It therefore promotes the question that without instant gratification, could the learner be able to visualise on his or her own?

Furthermore, would she or he wish to do so without the aid of a computer? This view very clearly highlights the disadvantages of the 'freelance scholar' (Schuler, 1997) and provide a strong argument to the case that IT will hinder the education process supporting the dispute that the personal touch so often offered by tutors could dissipate (Cornell, 1999).

The other side of the argument however, is that it is unavoidable that the role of the tutor will change (Westera, 1999). With so much information, students are less inclined to recognise the tutor's authority as an absolute expert and furthermore, lecturers are powerless to stop the flow of information to students (Cornell, 1999). Westera envisages the tutor/student relationship becoming more egalitarian. By empowering students to take responsibly for their own learning will become an effective learning technique. However, Jones-Delcorde (1999) suggests that learning could become more profound and meaningful if instructors simply supplement their current tool with innovative IT. He further states that there will be little change in the role of the lecturer since however virtual IT becomes, it will never replace the visual, mental and social stimulation of a good tutor. He believes learners remember more from a good tutor and hints at the degeneration of the learning process if learners respond only to instant gratification. This view is supported by Knight (1996) who suggests that teachers are not replaced by IT but take on the role of facilitating learning, and providing guidance.

It appears to be a view among writers, that rather than dismiss teachers because of their apparent ineffectiveness, a need has being identified to encourage true interactive learning with all involved. With increased access to reservoirs of information, many researchers appear to believe that it is inevitable that the role of the lecturer will change and possibly manifest itself in other functions which may impact upon the level of interaction institutions intend to provide. Perhaps the role of management is reaffirmed here and they must remind lecturers that they are there for the students benefits. This may however, be difficult since the increased workloads that will come with the facilitating of online tuition that is often overlooked but will surely have repercussions on the system and more importantly on the students.

5.0 IMPACT ON STUDENTS

There appears to be a mixed response concerning the impact of the Information Age on students of the system. Jones-Delcorde (1999) believes that IT is nothing more than a tool for learning. Despite the interconnectivity, computers offer no social interaction. Dertouzos (1997) agrees that students need community and the opportunity to be motivated by role models and fellow students. However, it must also be acknowledged that the links with other across the globe offered by IT are both very exciting and positive (English and Yazdani, 1999).

The empirical work of most researchers seems to suggest that the traditional university has being overtaken by events. Hutchison (1998) is of the view that there is nothing natural about traditional universities. There is nothing natural about being wrapped in cotton wool and nurtured into what society deems acceptable in a bureaucratic environment. Researchers have put forward many cases for education to move away from this sort of environment that would benefit the students. Firstly, Schurer (1997) writes that virtual universities would liberate students from this regimented conduct of traditional universities. Students would need to learn how to access resources as opposed to being spoon-fed information. Secondly, "in-time learning" allows the curriculum to become more fluent to suit the needs of the student. This encourages students to be more active learners, enhancing the intensity of the learning experience (Pantelidis and Auld, 1995). Hutchison (1998) makes the third point. He agrees that students will benefit from a shift from the traditional "print culture" to a more sensory culture which would help students to forge links with images they see and remember to information they need to learn. In addition, and as the fourth point, Joo (1999) believes that the Internet can make the content of lectures more vivid to students stimulating the memory and enhancing topic association. This could create an exceptionally positive attitude within students who previously experienced difficulty in and failure in their learning (Adam and Wild, 1997). An interesting point to acknowledge however, is that in the same way the Internet and other multi-media can relay positive and beneficial images, they can also reproduce strong stereo types (Joo, 1999) which can often lead to misinterpretation and the obscurity of rational judgement.

5.1 The Impact of the Virtual Classroom

So there is a difference between the traditional classroom and the virtual equivalent. Here the impact of the latter is further considered. Knight (1996) believes that the Virtual Classroom would be a new experience and would have positive influences on those students who are used to being spoon-fed. Students would no longer be passive and would develop a competence of working on their own initiative and relying on their own resourcefulness to gain results. In criticism of the virtual classroom, Kershaw (1996) warns that students in this learning environment must be prepared to use the technologies available and become more involved in their own learning with an emphasis placed on interaction with lecturers and students. The level of online interaction received by students appears to be indicative of the success of the virtual university. Berge (1999) considers that integration is central to the expectations of both teachers and learners and is the primary goal of the education process. This suggests that learning only takes place after interaction has occurred. This is the same way that students need to consolidate their knowledge by talking to other students which in turn, increases self confidence and self awareness (English and Yazdani, 1999). While many researchers agree that interaction is good and vital, Berge goes on to add that a mismatch of interaction, synchronicity and technology can lead to information overload, loss of attention, boredom and frustration. Students require intra-personal reflection to help integrate new experiences with existing ones. Conversely, Westera (1999) implies that a mismatch could exist from interaction with other students which results in ineffective, incomplete and erroneous feedback which is counterproductive to the learning process. Other possible repercussions from online learning as identified by Cornell (1999) are difficulties with service providers and a lack of experience in students. Bad time management would contribute to feelings of isolation and frustration, all of which suggest that the Information Age bring with it damaging affects to the students.

There are strong arguments for and against the asynchronous methods of teaching that virtual universities invite. There is the claim that synchronous communications can restrict students (Berge, 1999) while asynchronous communications does not demand students and teachers be present together which may offer convenience. Westera (1999) however, believes that in asynchronous environments, speaking skills and assertiveness will become less important. On the other hand, Barnard (1999) observes that students who feel too intimidated to speak out in class open up more online and there is less opportunity for dominating individuals to govern conversations. Barnard (1999) also believes that instructor interaction is enhanced online. Cornell (1999) agrees and states that students recognise the benefits of being able to progress at their own pace. They enjoy the flexible constructivist approach to learning as well as the freedom from the physical constraints of the classroom.

Taking together these studies, there appears to be equal cases regarding how the impact technology in education will serve upon students. It appears debatable that the consequences suffered by students as a result of a loss of face-to-face interaction is equal to the sometimes ineffectual information gained from discussions with fellow students. Motivation it seems will have to come from within rather than from other students. Inter-personal skills learned in a traditional classroom, although could be transferred to a virtual environment, will lack feedback and could dissipate. From a learning point of view, certainly at first, there may be little short term repercussions since students will not feel cheated since they will still receive global interaction which will be exciting. However, as students evolve and future generations evolve, the loss of face-to-face interaction may begin to lessen the learning experience.

6.0 IMPACT ON SOCIETY

The middle class demand for the social and economic benefits of Higher Education (Hosie and Mazzarol, 1999), constitutes a massive social pressure on society and government, despite which, education has undergone little change. Thomas (1986) notes that for many years education has been conditioned to be desirable the way it is. Any hint of innovation in the traditional method of teaching, loses societies endorsement. This inhibits change since beliefs are not challenged.

"Education's way of bringing order to the social chaos of turbulent times appears to be to opt for the multi-media that is safe, tried and true". (Cornell, 1999).

Society must strive to modify tradition because without a change, the result may be an impediment to appropriate learning and a threat to growth (Hutchison, 1998).

It is on this basis that the impact of IT in education on society is considered, should society accept changes. Researchers believe that the virtual classroom fills a void in society and IT in education should be welcomed. For instance, English and Yazdani (1999) have identified that in our society the nature of employment and leisure has changed. There is currently less of the former. Virtual universities could fill this gap and students will benefit from fruitful and fulfilling communications and learning. Additionally, Hosie and Mazzarol (1999) support this and already highlight that the event of home, school and work place education on demand is likely to outstrip the current focus on entertainment. This could be considered as one impact that the Information Age provokes in society. Thomas (1986) considers that technology must be adapted to and lived with and society as a whole must subsist along side. It proceeds independently of any disapprobation. In short there is no means of escaping. Westera (1999) explains that it should be clear that the learning environment is no longer a fenced off and protected area that allows carefree activities, but it is part of the outside world. This opinion is unlikely to have a profound affect on learning but may be taking life long learning to the extreme. A debate could then emerge if is it really healthy for students to be able to study at any time of day, any day of the week for any length of time.

Writers suggest three main impacts that the information technology will have on education that will consequentially impress upon all societies. Firstly, Schurer (1997) questions the possible demise of human attributes. He believes that those brought up with telematics are intelligent but suffer a deteriorated emotional capacity such as socialising with people they never actually meet therefore omitting the whole social experience from their lifestyle. This is turn restricts development attitudes and cultures. As a result of asynchronous environment "emotions are poorly transferred via computer mediated communications and may easily be disregarded or misinterpreted", (Westera, 1999). Secondly, Joo (1999) believes the Internet is not an educational innovation since it does not take into account cultural precedence. The Information Age seems to support the World Information Order reinforcing the flow of information from developed to developing countries regardless of culture. Therefore there is greater exposure of certain cultures encouraging marginal cultures to learn about it. Assuming that there is a language or culture that dominates the virtual environment, this questions the trustworthiness off the information available. Finally, there is the additional danger identified by Barnard (1997) that the current revolution is tele-communications threatens to create an expanding gap between the computer literate and the technologically deprived or technophobics.

The Virtual University encourages a change in the culture of learning. Hutchison (1998) identifies a perverse unnaturalness in believing that once a course of study is complete a student knows everything about that given topic. Distance learning and the vast web of information now available, allows everyone to be a student. The information age prepares students to be learners for life (Jones-Delcorde, 1999). Despite this, Shenk (1997) holds a more pessimistic view of the promises of the Information Age. He is of the belief that education is about enlightenment and not just access.

With a view to the management of social control, Joo (1999) suggests that governments may lose control over curriculum contents and pedagogical methods as schools gain more autonomy. This would clearly have an impact on authoritarian societies, unleashing a sense of freedom and anarchistic tendencies within educational institutions. Joo goes on to explain that submissive societies would not be praised for demonstration of individualism or creativity. The Information Age has little respect for culture. Likewise, the Information Age does not respect financial implications. Pantelidis and Auld (1995) suppose as more people send their children to private school, public education will become like public health. It will exist for everyone but used by those that have no options. As a result universities will become very costly. Perhaps however, technology will become an opportunity for financially disadvantaged students to continue learning with the advent of distance learning.

Arguments seem to assert to the fact that technology in education will have destructive impacts on the society. The main concern is the demise of emotional attributes as a result of lessened face-to-face contact (not interaction) will produce damaging repercussions including the promotion of isolation. It is interesting to consider that should society accept this decline in contact and integration and support the extent that life long learning offers, that future generations will evolve as isolated individuals with diminished social skills. There is also the concern over cultural issues. The Information Age does not respect the variances in cultures and students learning within these environments are put at a disadvantage - one that is ill-afforded when competing globally for sought after qualifications.

7.0 CONCLUSION

To conclude, there appears to be a mixed response from researchers in answering the question for this paper. Researchers have made it apparent that education institutions are due a change in the structure and the ethos. To date, education has been a static feature in a fast changing environment. This tallies with the British Council's discovery that UK HE is seen abroad as very traditional and unexciting, unlike the USA and Australia. However, there is the danger that since educational and professional qualifications are still in demand, the institution will become more profit based and maybe less concerned with educational standards. In addition there also appears to be an inherent culture with the ownership and territoriality of technology which will hinder education since students with access to technology will benefit where as those without will lose out. IT should be used across the whole spectrum of schooling and education and should therefore be pooled as such.

Research based on the impact of the information age upon the lecturers appears to intimate a deterioration in the system. With IT comes the removal of the term "a job for life". This brings less continuity to the education process since lecturers are constantly in quest of better opportunities.

Research additionally shows that lecturers are receiving less respect from students and have a diminished authority since students are finding more and more information on the Internet and dismiss knowledge and help from lecturers. This appears to be an indication that IT will have detrimental affects on education. Students follow the premise that lecturers have little knowledge, which in turn dissipates the personal touch and further diminishes teacher-student integration. Research has shown that interaction is an important experience that all students should encounter. Students need interaction within their community for motivation and to reaffirm views and opinions. Interaction however, does take place on the Internet and it can be done electronically. What however, is missing from this contact is the synchronicity of being present in the same place as another. Integration is the important factor here. This can only be achieved by sharing an actual time and place. Without this, research suggests that speaking skills and assertiveness will become less important, and therefore presumably will deteriorate over time.

On a positive note, technology and IT in education will help to alleviate problems such as learning difficulties and overcome introvert personalities, however, it must be noted that it will not change them. For instance, shy individuals will always be shy especially if they circumvent day to day activities with the help of IT and never has to interact.

IT must be lived with. It is an enormous part of every industry and enterprise, both globally and domestically. The broader a spectrum it provides, in terms of learning material, the better. Research has indicated that education and the passage of information will replace entertainment and leisure. Perhaps this is the extreme however. Just as individuals need integration, it is also feasible that a break from learning is needed, a change from absorbing vast amounts of information, a way of feeling revitalised in order to continue the digestion of information.

Finally, IT will improve the pedagogical system if used as a tool and doe not replace any component. The possible impact of a totally virtual educational environment could be detrimental to the students - the essence of the education system. Equally however, the education system should embrace the information age and adapt processes to accommodate the vast range of information available, in order to provide the lecturers and the students the best possible chance at providing and receiving an education. It is the development of technology based learning support structures, i.e. alternatives to formal teaching and learning strategies but embedded in the pedagogy, that will assist the education and training sector as we enter the next millennium.

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Virtual Education in Universities: A Technological Imperative.[11]

John O'Donoghue
Gurmak Singh
Lisa Dorward

Abstract

Many educational journals have debated the issue of the "virtual university". As technology is improving and evolving, such 'virtuality' becomes a reality. The forecasts are that, in the not too distant future, it will be possible for courses to be completed solely by the use of the World Wide Web or Internet. These "virtual classrooms" will take the place of the solid buildings where students currently attend lectures, at set times in set rooms. The information will be gathered at the student's convenience and assignments will be handed in via this medium. There is potentially an advantage for everyone involved, from the reduced building resource costs to the availability of teaching support 24 hours a day, 7 days a week

Whilst many of these studies identify the benefits of technology in education there are dissenting voices from many other quarters. However there are also arguments identifying the disadvantages to the technology based delivery systems proposed. Either way, there are going to be radical changes in the methods which students will use to tackle the workload involved in studying towards a degree. This paper will explore both sides of the argument. The main contention of this paper is that technology undoubtedly will offer many benefits for the learner, however, the pitfalls need careful consideration in the design of the learning environment. This paper uses examples from educational institutions across different cultures.

Introduction

Webster and Hackley (1997) explain how there are an increasing number of universities in the USA, which are using technology to a significant extent at a graduate level. One of the universities using technology at an undergraduate level is the Louisiana State University in America (Hall et al., 1999) and it is proving to be very successful, within the terms as defined by the authors.

The implications of the changes taking place, will need to be considered for the lecturers, the students and society before coming to a final conclusion.

Changes to higher education began over ten years ago before technology was considered as the prime motivator or driver. Beaver (1992) noted that teaching methods were undergoing 'revolutionary changes'. Clarke (1999) considers that in working to bring about such changes, staff have demonstrated innovation, enthusiasm and ingenuity. In the UK, the Dearing report (1997) outlined how any changes that take place within higher education will effect students, lecturers and management within the institutions that plan on adopting virtual learning, or managed learning, in the future.

In order to explore what these changes might be, evidence will be taken from different universities around the world that are already attempting to develop virtual environments, or have decided to wait until the media is stable and the arguments more refined for the creation of virtual learning spaces. The focus of this exploration will include:

- The drivers for change
- The impact of virtual education on the students' learning experience
- Impact of the changes within the Education sector on society
- Changes to the role of the tutor and the University infrastructure

The drivers for change

With over 62 million users of the Internet in the USA alone (Hosie and Mazzarol, 1999) the pressure on higher education institutes to take perceived advantages of these developing technologies is immense (Hardin and Ziebarth, 1995). Perhaps not surprisingly the education sector is starting to behave like any other industry operating in an open competitive market, potentially with international as well as domestic 'outlets' (Duguet, 1995).

Whilst the need for higher education opportunities is increasing, at the same time costs associated with public universities are being reduced (Barnard, 1997, Cornell, 1999). A solution to this problem may exist in the form of distance learning through the new technologies.

Coupled with the changes in customer demand the structure of universities may need to change to respond to the imperatives of the technological development (Kershaw, 1996; Gubernick and Ebeling, 1997). In global terms, student numbers are growing for education that embraces 'flexibility', that is not constrained by time and place and at an affordable price (Gilbert, 1996).

There is no doubt that universities need to be aware of the competitive pressure engendered by advances in technology and options this presents in terms of cost and benefits (Pritchard and Jones, 1996; Daniel, 1996). Market opportunities open up and a diversifying student base can be realised if more access and delivery channels are available (Stamp, 1998). Westera (1999) explains that the learning environment is no longer fenced off and a protected area but is a part of the outside world. New educational providers have sprung up over the last decade to fill the undeniable demand for open, flexible, lifelong learning. These new providers include for-profit universities, corporate universities, virtual universities and organisations such as Microsoft (Mason, 1996; Authers, 1998).

One of the new providers that has the potential of dominating the future is the virtual university. Gilbert (1996) proposes, that a pure-bred virtual university is in cyberspace – without walls, coffee bars, or seminar rooms. In the UK the Open University has demonstrated the way with its distance learning techniques. The work of Gilbert (1996, p.4) suggests that, *"virtual is the shape of things to come"*. International virtual universities will offer courses with high 'brand' recognition, and may even be based on franchising via the information superhighway of one or more of the great education brands, perhaps an 'Ivy League' university or a consortium of universities. If the so-called traditional university is to survive in this new environment, they will do so only by matching the multimedia sophistication and global educational networking of the virtual universities. Distance learning is cheaper than fulltime education, and according to the work of Daniel (1996) poses a great threat for those who have not adopted it. The traditional universities must themselves, driven by competition and market forces, become virtual universities, and demonstrate that they can offer education of a significant qualitative difference and superiority, accessibility and low cost (Mason, 1996).

Impact on the students
Changes in teaching methods and the increasing usage of the Internet will inevitably have consequences for the student body. There is a vast amount of literature surrounding the changes that seem to be inevitable and some of it now is concerned with how students are going to assimilate a new environment, which is based on a remote delivery methodology via the Internet. This is particularly for those students who are familiar with the context of the traditional class based activity and culture.

Malaysia is one country that is very much in favour of computer-based learning (Majid and Abazova, 1999). A study put together by 180 of the academic staff of the International Islamic University in Malaysia, demonstrated a relationship between computer literacy and the use of electronic sources of information. Students with better Information Technology (IT) skills were able to take advantage of the World Wide Web and other such sources of information where students without these skills were not and as a consequence felt disadvantaged in terms of the courses being undertaken. Malaysia does not value the importance of face-to-face contact with the teaching staff as some other countries do. The USA, for example, is going back to traditional methods in some universities, as traditional classroom based activity and interaction within an educational context is considered the best way for people to learn. Similar views are shared by Allen and Wilson (1996) who are of the opinion that whilst students can see the benefit of the Internet and all of its uses, contact with lecturers is still preferable. The authors feel that the students learn more from interaction with people.

Nicol (1998), from the University of Aberdeen in Scotland, is of the opinion that there are drawbacks in relying heavily on the Internet. It can be difficult to find exactly the information required due to the sheer volume of articles that are brought up with every search and the level of detail that companies go into on their web pages. The time that is spent in downloading information can also be slow if it is busy, for example during normal office hours. Nicol points out that as technology continues to improve this particular access and speed problem may well be alleviated. This appears to suggest that students without reasonable IT competence will not achieve success. Watts (1998) points out that whilst there are apparent advantages to virtual learning, there are certain elements which cannot be learnt, or are difficult to create via a computer screen. The perspective here is that a deep understanding of the subject area and valuable skills, such as team work and presentation, are not possible to grasp without physical interaction from lecturers and the interaction with other students.

American universities that are using the Internet as a basis for studies are having difficulties with students not being able to relate the theories and methods that they are learning to real life and society (Watt, 1998). This could have an adverse effect on commerce and business once these students graduate and seek work positions. The skills traditionally learnt through studying at university would have to be learnt in the working environment. This leads to the thought that the impact on students in this context could be a negative one and could prevent graduates getting positions from a lack of social and communication skills.

Access to the Internet allows for distance learning that may encourage people to return to education who would not otherwise due to work or other personal commitments. The success of the Open University in the UK (Duguet 1995) suggests that there is a market for distance learning. As lifestyles are becoming increasingly busy and more complex for the majority people, the market for this style of learning may become broader than it is at present. Lifestyle patterns have changed and reflect an emerging overlap of education, training, work and leisure activity. The figure below illustrates the changing lifestyle pattern, moving from cognate stages or milestones within a more traditional learning domain to a more flexible, open, learner led approach. The traditional lifestyle pattern appears as a sequence of events and activities, whereas lifelong learning encroaches on all aspects of activity. This can be defined by the individual or by the nature or need of the activity.

The model of teaching and learning must therefore accommodate flexible, independent, delivery mechanisms. The traditional approach of jumping hurdles at the end of a particular educative milestone is no longer appropriate. Flexible Internet based delivery makes access to learning potentially easier for students who need to fit studies around other commitments, which may have previously prevented higher education. Greenhill (1998) argues that 'virtual reality' can make the best use of time as the information is required at the student's convenience and so the study programme can fit around other obligations.

The traditional lifestyle pattern

The new lifelong learning pattern
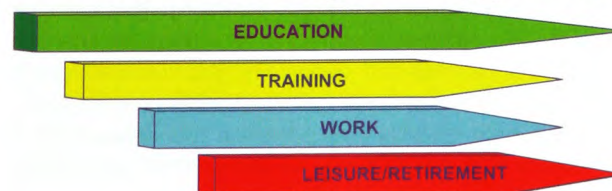
The perspective of Hall et al. (1999) is that there are benefits of using email for homework assignments for students who are now using these systems. Louisiana State University, USA uses the World Wide Web to administer assignments and also to return grades and feedback. The outcome of this system is that the student can receive the grades in their own 'space and time'. The feedback is available and grades can be further manipulated into spreadsheets to give the student an on-going record.

There is even a facility to allow students to collect grades at home with the use of a codename. Hall et al. (1999) claims that the system of email works very effectively. It is felt to be a very practical system for all parties involved and the university in Louisiana is now looking at increasing the usage of the Internet for day to day convenience, but predominantly at an administrative level. Watts (1998) is of the opinion that information technology will increase the choice of how the work is delivered, the content, access and practice in order to be suitable to each individual student. This may allow for better results as students can use media that is appropriate to their unique needs and learning styles.

Learning environment
These studies show that there advantages to students having access to the Internet (Nicol, 1998). At the University of Aberdeen the use of the Web is highly encouraged. Students have the opportunity to collect research from a variety of sources, which can come from anywhere in the world, giving very broad, detailed information about any subject. There is also the chance to publish work on the Web and to take part in collaborative learning and discussion groups with others students. Nicol comments on the Web as being an 'enhanced learning environment' providing a rich resource of global information. Watts (1998) is also keen to encourage the thinking of education as being a process not a product. His recommendation for students in order to continue to be successful in all aspects of their studies is for the universities to encourage online learning in some aspects of the course but to limit complete distance learning as there are potentially social and cultural skills which can be marginalized. There appear to be advantages for students as the opportunity for significant information is available and the volume of articles is tremendous, but this brings an additional burden of information management or 'filtering'. In terms of the interactivity, there is the problem of not enough interaction and discussion with and between students and lecturers. This illustrates the need for an enhanced curriculum of which the Internet and e-Activity provision is just one of a variety of media, for use when appropriate. In fact some findings of Honey (2001) suggest that the differences between learning styles and eLearning styles are marginal. It is the convenience of learning via an electronic medium and the notion of personal self managed learning that appear to be the main attraction.

Clarke (1999) is of the opinion that British universities are currently in the middle of developing and promoting new approaches to learning and teaching. His view is that university staff throughout the UK have been working to bring about these changes and have demonstrated innovation, enthusiasm and ingenuity.

The Internet is one of a variety of media; and as educators we find out the strengths of each one, and use them as appropriate, depending on the nature of the course, the learners etc.; or - we stick by the strengths of conventional contact. The Internet is very useful for simply delivering as a resource what is the text of lectures - the input for thinking, and for higher cognitive skills work, as well as learning in other domains. A most striking example of the latter was in a recent article in the NY Times (2001), where the Massachusetts Institute of Technology has chosen to post virtually all its course materials on the Web, free to everybody.

Impact on society
There have been recent suggestions in the news and media throughout the UK that children are perhaps becoming too dependent on IT and social skills are in danger of being neglected in favour of Internet 'chatting' and other such non non-personal communication and interaction. If this is the case, 'virtual universities' could end up creating more problems than they could potentially solve. This might indicate less 'learner centric' activities in a direct classroom based environment, these being replaced by 'virtual' activity which is potentially less threatening as the face-to-face dimension is removed and the distance is seen as a positive attribute. Hutchinson (1996) is of the view that society should not embrace the wonder of new technology too readily. He suggests that society should actually think about what the consequences of computer use for every day chores and work could be and who would be affected.

The majority of young children of today seem to be very comfortable with computers and take computer terminology and jargon for granted. US President Clinton desired that all children in America would have access to a PC and the Internet in this Information Age, (Schwartz, 1998) but thoughts must turn to the social skills that these children could lack from spending so much time 'surfing the Net'. Universities in Malaysia are not putting the emphasis of technology on the children as they feel that the target market for their expansion into the information era is to be aimed at young adults, principally FE and universities, (Majid and Abazova, 1999). This lack of 'essential' skills that are currently learnt at university through

group work and interaction with other students are disappearing from the university experience, (Nabi and Bagley, 1998).

So alternative strategies, substitutes and pedagogically sound developments need to be considered to explore the different styles of possible interaction. Nabi and Bagley carried out a survey of recent UK graduates to discover their perception of the skills and competencies that had been learnt and acquired through the duration of their course. The question was whether these skills were suitable for future employment and the development of their careers. The survey revealed that the graduates felt that the skills that they had acquired were not as developed as they felt they should be and that the skills in information technology were the lowest. The results from this study suggested a need for universities to improve certain key skills in their undergraduates.

Over time the increased usage of computers may help students develop IT skills, but this is only applicable to a relatively small cohort of students. The use of the technology is more pertinent, but this could lead to a lack of student and lecturer interaction, (Duguet, 1995). This concern is also evident in the work of Nabi and Bagley (1998) and Schwartz (1998).

The teaching environment
In many cases emphasis is being placed on the eLearning method's ability to provide quality services at a reduced cost as demand for higher education increases (Duguet, 1995). The increase in both the number of higher education institutions and the access by an increasing proportion of the population to this HE resource suggests that these costs will continue to rise unless there is some definitive structural change. Postiglione (1997) sees the role of a lecturer as one that needs to be adapted to this new technology as the environment changes. As already intimated, the environment is changing as governments encourage more people to attend university, particularly in France and Germany (Duguet, 1995). This changing role certainly appears to be the case as Clarke (1999) discusses the alterations that are being undertaken in British universities. Nicol (1998) explains how the Internet can be used as a low cost distribution tool for giving students the information they require and the courseware which is relevant to each individual course. Internet browsers are now either very inexpensive, or free. Duguet (1995) also comments on the ineffectiveness of traditional mass lectures as a teaching method as there is no dynamic interaction between the lecturer and the student. His view is that distance learning allows lecturers to have the time to explore new information on the Web and that this will have positive effects on the students, as there will be potentially more information and opportunities for interaction available to them.

Clarke (1999) from the University of Warwick, comments that most of the innovations taking place are mainly due to financial constraints. These innovations taking place have been revolving around the Internet and the concept of distance learning is perceived as the low cost action. Clarke further states that the lecturers at Warwick have been using software in order to conduct online tutorials and lectures and also automated grading systems. This application of technology is now being used at a number of American universities (Duguet 1995). Schurer (1997) adds to this argument as he proposes that CD-ROMs will replace lectures and that arrangements will have to made far in advance to meet with a tutor. Recent studies suggest that the role of lecturers is going to sway towards an advisory or facilitation position. Malaysian universities are also taking this approach of increasing technology use and access and the country is able to demonstrate how the use of technology is going to help Malaysia become a developed nation by 2005 (Majid and Abazova, 1999).

Collins (1991) believes that this increased dependence on the Web will bring about many changes in the teaching styles used. Traditional methods of delivery are either in decline or being enhanced or supported by alternative, multiple media delivery mechanisms. Collins proposes that this will affect the students more, and with effective planning teachers can contribute more actively to the learning taking place by the students. This should enable lecturers to spend more time at an individual level than is currently possible (Longstaff, 1999). This allows the teacher to identify personalities, areas of individual concern, and assist and progress work at an almost personal level of student. It can be seen from this that the role of the lecturer will turn from being one of a formal teacher or 'knowledge presenter' to being an advisor or facilitator, a mentor to provide guidance and support. The role will enable staff and students to develop more individual work patterns and learning strategies.

As well as changes in learning methods, there are also variations being made in the way students will be taught (Clarke, 1991). The lecturer may adopt a management and supervisory role as opposed to the traditional view of the lecturer teaching students particular subject content. The Dearing Report (1997) states that there is a need for a change at the level of the teaching staff. This change should involve the lecturers being experienced in managing people and also have a firm grip on the IT that is now being used so readily by students. The main point from this information seems to be that lecturers have to keep up with the changes that are occurring so rapidly, and that they must also be prepared to adapt to these changes at the same rate as the students are able to cope with it. Clarke (1999) and Collins (1991) agree with this change of role and also feel that there will be more of an advisory disposition to the role of lecturer, rather than of a formal teaching stance.

Changes in university structure and management

Evidence from surveys in the 1990's suggest that Universities appear to be slowly adapting to the use of IT and are starting to change the structure of the organisation. The International Islamic University in Malaysia started restructuring some years ago in order to become a 'better-developed' country (Majid et al, 1999). The internal political opinion was that IT could help the country bring itself into the Information Age and start gaining the skills that are enjoyed by more well-developed nations. Universities in the United States, however, have joined the Internet 'frenzy' with relish, (Hall et al., 1999). Structural changes have radically altered both internal and external environments within higher education – affecting course changes, teaching delivery, administrative hierarchies, faculty and school boundaries. Such major upheaval is starting to bring about a new system of learning in higher education.

Greenhill (1998) undertook a study of universities in Australia to examine how the structure of a 'virtual' organisation differs from an actual organisational structure. One of the main differences is based on the non existence of a time factor in cyberspace. The only time factor used is the length of time one person is logged on and when they log off. Furthermore, information is transferred from one side of the world to the other so quickly, it seems to take no time at all. Greenhill sees 'virtual' universities as being an extension of the real world due to this complete disregard for time as used in real life. To accommodate such measures a '24/7' curriculum is an extreme measure of re-structuring and most universities would probably be unlikely to take change quite this far and the time issue alone is seen as an insufficient reason. There is still a need to have systems, however technologically inclined, which demonstrate student interaction, with and between students, tutors and peers. Duguet (1995) also points out that higher education is becoming less and less like the traditional public service that it once was and more and more like an industry. This 'industry' has potential clients not just domestically but internationally too, and so the possibility is that this industry will have to compete in order to stay in business.

The structure of courses is also changing. Courses are now being adapted to suit the needs of the mass population, rather than educating an 'elite' selective academically able minority in theoretical aspects or pure research. The University for Industry (Ufl Ltd) is one such initiative which is essentially web based and consists of 'courses' ranging from 40 minute skill development to 30 hour credit bearing materials. Universities across the world have to adapt to provide what is demanded or else there will no one wanting to take the courses which are available (Duguet, 1995). The biggest change seems the development of 'made-to-measure' courses which are becoming increasingly popular. Duguet's view is that the present system of higher education is being constantly challenged by new demands to make courses for students' needs and requirements. The system of made to measure courses is currently being proposed in France. If proposals such as these are put into practice then there may be no difference between 'traditional' students and students undertaking distance learning. Each student will be in the position to combine studies so that there will be contact with teaching staff, but work can be done off-campus too, with the aid of technology. The trend has already been developed in a number of countries; there are 42 dual mode universities of the 69 universities in Canada, and a significant number of establishments in America offer multiple modes of study and delivery. Fifty per cent of British universities as well as 30% in France and 40% in New Zealand are also dual mode. This suggests that the Information Age has permeated quicker than originally thought and that virtual classrooms may soon not be a thought for the future.

Many of the studies in the late 1990s focused on individual differences such as age, gender, computer experience, communication skills and preferences, personality and learning styles (Taylor, 2001). Shaw and Marlow (2000) concluded that age and gender were important demographic factors. Mature students may be less willing to learn new technologies: however, they do have more diverse knowledge and experience than younger students and may be able to apply these attributes to new situations. Other studies, such as Morgan and Morgan (2000), found that the more mature individuals disliked groupwork and were more likely to report system based problems.

The re-structuring occurring in universities worldwide involves changes at all levels. These changes seem to be involving the acceptance of new technology, a changing role of academics within the establishment, organisational re-structuring and the targeting of new target markets by changing course structures. There is also evidence to suggest that universities are changing their organisational structure. All universities are using quite similar approaches to re-structuring in order to cope with the influx of information and technology. This reinforces the thought from Duguet (1995) that universities are becoming business minded.

This relates also to the development of the e-University, proposed as a UK initiative early in 2000. The vision for the e-University is not as a university in any conventional sense of the word, but instead to consist of a set of facilities, devices and mechanisms to enable potential consumers to access the best of UK higher education. The concept of the e-University has several ways in which it could operate. At one end of the spectrum. It could operate as a fairly conventional and complete but 'virtual' university. At the other end of the spectrum, the e-University could function exclusively as a provider of tools and services for use by other universities. This is a component of the model proposed in the PricewaterhouseCoopers report (2000).

Conclusions
There are strong arguments for and against the asynchronous methods of teaching that virtual universities invite. There is the claim that synchronous communications can restrict students (Berge, 1999) while asynchronous communications do not demand students and teachers be present together which may offer convenience. Westera (1999) however, believes that in asynchronous environments speaking skills and assertiveness will become less important. On the other hand, Barnard (1999) observes that students who feel too intimidated to speak out in class open up more online and there is less opportunity for dominating individuals to govern conversations. Barnard (1999) also believes that instructor interaction is enhanced online. Cornell (1999) agrees and states that students recognise the benefits of being able to progress at their own pace. They enjoy the flexible constructivist approach to learning as well as the freedom from the physical constraints of the classroom.

The sheer volume of literature on the 'virtual' or 'non class' based learning and teaching through cyber space indicates that the arrival of the new style of teaching and learning is inevitable. Universities in Malaysia and America, as well as in Europe, have been shown to be investing heavily in attracting new forms of learners. The vision is one of students and lecturers at home with their PCs. At the extreme end of the scale, it could be possible that the campuses that are scattered around the world will disappear, as the need for them becomes obsolete. Students could then acquire degrees without ever attending a mass lecture or interacting face-to-face with an academic. This idea is probably too extreme as all the current evidence reinforces the importance of interaction. No two learners learn from the same presentation in the same way or as well. No two instructors use the same medium in the same way or as well. No two lessons are suited for delivery by the same style or through the same medium (Graziadei & McCombs, 1996).

The IT evangelists claim that traditional methods are unlikely to stay intact as universities need a larger clientele to remain viable. There is also a need to create more adaptable courses to encourage adults to participate in further education, higher education and lifelong learning or to feel able to return to studying after a period of absence. There is also an increased need for interaction which traditional lectures often struggle to provide, due to their structure and mode of delivery to a 'mass' audience. Technology will not necessarily always replace such environments, nor should it. It is the contention of internal developments at such establishments as the University of Wolverhampton, (O'Donoghue et al, 2000) that technology will enhance the learning experience. Good computer-based communication is necessary for collaborative learning which has the advantages of meeting a variety of learning style needs, of overcoming time and space barriers, and of creating group cohesion among dispersed learners (Ellsworth 1994).

A compromise between these two extremes may be the future design of higher education. The 'made-to-measure' degree structure that Duguet sees as the way forward will possibly be the way of the future. Students will rely on the Internet for information but will still be able to interact with academics and other students to gain the skills that Nabi and Bagley say is lacking from higher education at the present time. Current research suggests that different cultures across the world are embracing the Web as a platform for delivery of materials, teaching and learning.

Whole institutions are assuming a technological identity or focus. This inevitably will change the focus and nature of all aspects of the educative delivery process. This will include the administrative and management hierarchies as well as the 'chalk face' delivery mechanisms in the classrooms. Group and social interaction is an important facet of educational process and however 'virtual' the future learning establishments are, such communication must be retained, technologically established and enabled and transparent interfaces provided for the non computer expert!

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Implications for Planning eLearning Strategy in Higher Education Institutions.[12]

John O'Donoghue
Gurmak Singh
Jagtar Singh

ABSTRACT

The strategic direction of Higher Education (HE) institutions is increasingly being influenced by environmental conditions. The advent of eLearning, together with increasing demand for flexible, off campus instruction, has forced universities to become more proactive in the way they market themselves. Competition for students is now not just locally based but global. The structure of institutions and the higher education sector has come under pressure in response to the changing marketplace and its increasingly competitive nature. Because technology is not the only ingredient of success, other factors such as organisational structures, changes to teaching and learning strategies and approaches to Information Technology (IT) planning for business strategy need to be considered. There is concern that eLearning will increase polarisation between those who can afford access to new technology based education and those who cannot. This polarisation can occur on a local as well as a global basis. The aim of this paper is to examine some of the key issues relating to eLearning and its impact upon students and the strategic behaviour of higher education institutions.

INTRODUCTION

Universities are under increasing fiscal pressure and, due to 'league tables'[1], their performance is open to public scrutiny and comparison with other institutions. On the one hand they have to assess the cost benefit of providing particular courses whilst on the other having to ensure that the output satisfies market expectations. Increased global competition has been a pressure for change in many markets and is now influencing the higher education arena. The combination of improved performance and lowering cost has meant that more and more teaching materials are becoming available globally on the Internet. Technological developments themselves are a pressure for change. Ehrmann (1997) uses the phrase "worldware" to refer to technology developments which were originally designed for applications other than education but have nevertheless changed the face of teaching because universities and students had a degree of familiarity with them. E-mail, the Internet and computer aided design are examples of worldware.

The trend from traditional to eLearning is driven by economic, demographic, technological and social factors. Teaching staff costs are a high proportion of total costs within a university and as the shortage of funding becomes more acute, staff costs will come increasingly under scrutiny. A further pressure for change is the greater focus on performance indicators of teaching quality. This has increased the consideration given to alternative teaching methods. Expansion in the number of university places available is failing to keep pace with increasing demand. According to Daniel (1996) "*a sizeable new university would now be needed every week to sustain current participation rates in higher education*". Even if the financial resources were available there would still be the problem of finding sufficient staff. The nature of the education demanded by students has also changed. Increasingly students want an education that will prepare them for life in an electronic world. Without investment in eLearning Bourner and Flowers (1997) promote a pessimistic scenario with increasing class sizes for lectures and tutorials and individual tuition becoming a thing of the past. Their scenario adds that universities will direct their efforts towards courses that offer a high financial contribution per student, i.e. where class numbers are high. They predict that dedicated universities will run the more specialist programmes.

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1. League tables are published rankings of Universities. There are a variety of tables from major newspaper and book publishers to government departments. Some measure aspects of university life, research funding, employer orientated snapshots of university performance and associated factors. Some data is drawn from published statistics, which have been collected by government and official agencies.

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1 Review of eLearning strategies

A key issue for practitioners is recognising that not all students perform well in the distance learning environment. Individuals who need social interaction in order to perform academically will find distance learning difficult. Studying a subject in isolation requires a high level of motivation, time management and a focused approach. The traditional campus provides the opportunity for a relationship to develop between students and the tutorial facilitates the exchange of ideas, Ehrmann (1995). The lack of social interaction is a significant shortcoming of eLearning, Bourner and Flowers (1997) suggest that the introduction of new technology creates a requirement for more of the "human touch", they see this as being a prerequisite for the successful adoption of new technology. Daniel (1996) puts forward a different perspective by suggesting that the idea of an academic community will have to be reconceived with emphasis moving away from the campus as a common focal point. Instead, universities will need to invoke a sense of "institutional belonging" among staff and students.

There is a consensus as to the main benefit of eLearning; this is its ability to make education accessible to a much wider population because of its flexibility. Students are able to learn wherever they have access to a computer and at whatever time is convenient. In addition, as the potential student base is global, the cultural diversity of students brought together by eLearning promotes interactions, which would be otherwise unlikely. Whilst some writers (Dertouzos, 1997; Jones-Delcorde, 1999; Morrison, 1999) suggest that students studying using eLearning experience isolation, others (Barnard, 1997; Cornell, 1999; Knight, 1996) suggest that the opposite is the case. Hawkes and Cambre's (2000) opinion is that, just as sports events bring students together in competition, there is value in bringing together students from different establishments to collaborate in intellectual endeavours through eLearning. Universities try to overcome the sense of isolation and instil a degree of class cohesion by incorporating residential weekends or weeks into courses. Jana (1999) makes the point that while eLearning is suited to topics based on fact it is not the most appropriate learning method when the content is subjective or improved by discussion.

Research on the positive aspects of distance learning for students is plentiful, but mostly qualitative, and there is little quantitative data that compares the effectiveness of traditional education and eLearning. Researchers at the University of Michigan have analysed the effectiveness of eLearning. Their basic conclusion was that the application of computer based multi-media results in a 20% improvement in learning outcome and speed. In the view of Ehrmann (1995), few other teaching methods have shown such a marked improvement in performance. In addition, when students were tested on the material covered in a particular lecture, the range of test scores was the same whether they had seen the lecture in person or on video. Ehrmann goes on to outline the surprising finding that in a language test the performance of e-Students was superior to those taking the test in the traditional setting. He attributes this to the e-Students being more involved and being able to express themselves. Donoho (1998) reinforces this point by commenting that the relative anonymity of e-Students increases the likelihood of them asking questions and raising issues, which many would feel too inhibited to do in the lecture room. eLearning offers students benefits with regard to assessment and feedback. White (2000) makes the point that student satisfaction with the quality of feedback from teaching staff is higher for those on eLearning programmes than on traditional courses.

2 Planning teaching strategies

The driving force behind eLearning is not to challenge traditional education establishments but to overcome the latter's inherent problems of scarcity and exclusivity. Ehrmann (1995) argues that universities are under pressure to educate more students, many of whom are mature students in employment. The view of Matthews (1999) is that the inability of traditional universities to grow to meet increasing demand has resulted in the development of eLearning, which instead of offering seats offers the opportunity to learn. This has ramifications for lecturing staff in the way they perform and, in the long term, for the structure of the profession. It is suggested by Dempster (2000) that many lecturers are sceptical about the effectiveness of eLearning due to the lack of supporting evidence and case studies. McConnell et al. (1999) state that evaluation often receives inadequate attention as a consequence of insufficient funding, enthusiasm or understanding of effective methodologies.

Bourner and Flowers (1997) highlight several forces of change affecting lecturing staff: falling budget per student; increased focus on teaching quality; and developments in technology. They predict that as resource per student becomes more scarce then universities will increasingly play the role of information disseminators, making their work more vulnerable to replacement by distance learning. It is important that universities foster a culture where eLearning is perceived as an essential part of the teaching media, without this recognition its introduction will be resisted by teaching staff. The development of eLearning programmes can require sustained contribution from academic staff. White (2000) emphasises the importance of staff development and highlights twelve key competencies. These include having the ability to cope with a high level of student interaction, a tolerance of change and willingness to be innovative in teaching methods. According to Greenguard (1999) running an eLearning programme has more similarity with the seminar situation rather than the traditional lecture. This will require teaching staff to adopt a different approach as students will have greater independence and require more detailed 'coaching'. In addition, Greenguard comments that what proves successful in the lecture room may not work in the online situation so it is important that teaching staff adapt course material to fit the context.

3 Organisational planning

There is a diverse range of views on how eLearning will affect university structures. Some writers have suggested that the traditional campus will cease to exist. Others point towards a two tier structure with universities that fail to embrace eLearning becoming satellites for those which have. McConnell et al. (1999) suggest that currently the internal structure of universities is based on the most convenient way for universities to organise their business, rather than the best ways for students to learn. They suggest that universities will be able to choose parts of courses from a world-wide selection available from traditional universities, privately run universities and other online education providers.

Bourner and Flowers (1997) are supporters of the two tier view and forecast that it will come into existence by 2007. They argue that the future university structure will be based on universities in the lower tier concentrating on first and second year undergraduate level with their students then moving on to the upper tier institutions. Matthews (1999) suggests that the development of the two-tier system is already taking place. She found that the US institutions which have adopted eLearning focus 35% of their output for use at other institutions. To establish this two tier system universities may form joint ventures and partnerships with community colleges. This partnership building theory is shared by number of writers (Pritchard and Jones, 1996; Stamps, 1998; Weir and Smallman, 1998) who claim such initiatives will lead to substantial cost savings as well as improvements in the quality of the teaching and learning material. Perhaps future universities will act as brokers for courses and specific modules. The traditional degree course will become less relevant as students will demand more flexible systems of delivery and accreditation. This is accreditation of both the courses, delivery methods and the tutors delivering the courses. The quality control issues for remote management are not insignificant. According to Kearsley (2000):

"...Given the common concern with the quality of online courses, it is no surprise that the credentials of those who teach and the institutions that offer such courses are subjected to additional scrutiny. Likewise, to the extent that course workloads are related to credits and learning outcomes, there is a connection between accreditation and the nature of online courses. "

4 Strategic Planning

The fact that the typical e-Student will be mature and be in employment will lead to more employees learning online while at work (Greenguard, 1999). There is a growing realisation by students, employers and universities that, by combining work and study, learning takes place at a deeper level of understanding and students are able to apply their knowledge more effectively. The implications of this upon university structure are likely to be that some organisations will form their own corporate universities or will run eLearning courses at the workplace. New technology has had an effect on the economics of the education sector in that it has lowered the barriers to entry to new educational suppliers. Traditional universities will in the future face a far higher degree of competition, which will force them to become more proactive in establishing links with employers to gain access to students learning in the workplace.

Ford and Motorola are examples of organisations that have established corporate universities. The Motorola University offers one hundred largely IT based courses with staff able to register through the Intranet. In the UK, six organisations have established corporate universities: these include Body Shop, British Aerospace, Price Waterhouse and Unipart (McConnell et al., 1999). As well as corporate universities the structure will be determined by profit-making privately run "mega universities" (McConnell et al., 1999). An example of such an establishment is the University of Phoenix in the US, which has more than 48,000 students. The university manages an online library, has no contracted staff and operates from rented buildings. Daniel (1996) is an advocate of the view that as universities adopt new technology they will need to operate in partnership with other education providers, nationally and internationally. Stirling University, for example, is offering a Masters degree that is delivered online in conjunction with the Universities of Barcelona and Southern Queensland.

A number of obstacles to change are outlined by Matthews (1999), these include the high cost of establishing an eLearning facility, the need for staff training, inadequate infrastructure and maintaining sufficient student contact. The financial cost involved relates not only to tangible costs for hardware and software but also to intangible costs for cultural, infrastructural and support implications. Hawkes and Cambre (2000) maintain that one intangible cost which is often overlooked is the cost of teacher time spent learning to use new technology and to integrate it into course programmes. Moreover, they point out that the length of time taken for an investment in eLearning to show positive results can be difficult to incorporate into a cost effectiveness analysis. They refer to studies that have found that distance learning projects can take up to a decade to prove viable. Ehrmann (1997) agrees and urges that claims by universities that they can teach a particular module more cheaply by using new technology should be treated with caution.

CONCLUSION

Higher education institutions are having to function increasingly as commercial enterprises in order to respond to political policies, which require universities to become more self sufficient in their resourcing, and to changes in the environment which have created a competitive sector. The large lecture never was a perfect educational solution to the problem of cost-effective access to high quality instruction. Such teaching can only be used in one place, at one time, by a few learners. eLearning will help to address these shortcomings and provide universities the opportunity to attract students from anywhere in the world who can study at a time, place and speed convenient to them. eLearning is better suited to mature or postgraduate students because of the high level of self motivation required, undergraduates are more likely to need the social interaction and peer influence provided by the campus. What is clear is that eLearning does make education accessible to groups previously excluded due to restrictions posed by location, work or other constraints.

The pace of change within eLearning technology is rapid and teaching staff will be under pressure to constantly update their own knowledge. Those who lack the requisite expertise, or prefer traditional teaching methods, may find themselves portrayed as inferior. University managers will need to ensure that appropriate staff development and motivation programmes are in place. As the higher education sector becomes more competitive a hierarchical system of universities could develop and merger activity could become commonplace.

The level of demand for higher education is increasing at such a pace that without investment in eLearning the quality of education provided will deteriorate due to larger class sizes and heightened pressure on staff. From the perspective of universities, eLearning offers commercial benefits in that a course can be made available to a global audience rather than those seated in a lecture room. It is these commercial considerations which will ensure that universities embrace eLearning.

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Implementing eLearning Programmes for Higher Education: A Review of the Literature.[13]

Kayte O'Neill
Gurmak Singh
John O'Donoghue

Executive Summary

This paper is a consideration of the issues associated with the infrastructural aspects, pedagogic considerations and the need to associate the usefulness of technology to enhance the learning experience. This technological path will potentially enhance the learning process, not replace the lecturer or tutor. For lecturers and students, the implications of eLearning are extensive. Increasingly universities must provide quality and flexibility to meet the diverse needs of students – this will inevitably involve tailoring courses to suit differing educational needs and aspirations. Lecturers will be forced to fundamentally change their approach to teaching to accommodate the shift in student learning styles. The associated implication of increased workload requires proactive and effective management. Alongside this, eLearning threatens the fundamental structure of the university itself, as research forecasts that institutions cannot retain their traditional structure, in facilities and delivery via formal lectures and class based activity. It is clear that universities must change to accommodate demand and in response to new competition from global, giant corporate and virtual universities, however the problems associated with the change must be fully understood and taken into account prior to the transition taking place. Whilst the benefits of eLearning are highly prophesised, the many implications of implementing an eLearning programme require careful consideration. Getting it 'right' the first time will ensure long term success in a highly competitive market. Most, if not all the UK university sector are utilising technology to develop what they consider to be eLearning. Many of these implementations are costly and yet superficial, in terms of learner engagement and activity. They provide a content repository and in many cases limited active learner participation. For many students this results in endless reading of screen based text. When staff are 'forced' down the eLearning route as a consequence of management directives and mission statements the creation of sound pedagogic practice is often flawed or missing completely and activities constructed service the technology rather than student or learner progression or association.

Keywords: Higher education, eLearning, competitive environment, change, virtual, organisational change, infrastructure, quality assurance, teaching and learning styles.

Introduction

Education has become a commodity in which people seek to invest for their own personal gain, to ensure equality of opportunity and as a route to a better life (Davies, 1998). As a result, providers of Higher Education (HE) are finding themselves competing more than ever for students, funding, research, and recognition within the wider society. Whilst competition has always been an issue for universities, historically the focus was national rather than international. During the last decade and through the development of virtual education i.e. distance methods of delivery and new communication methods, HE has become 'internationalised'; providers are able to export them-selves and as a result competition has been extended beyond national boundaries. Institutions which are actively seeking new markets and are able to utilise technological progress to structure themselves to deliver programs anywhere in the world are ideally placed to see their activities grow on a world-wide basis. However, for those who are complacent, the threat of being 'left be-hind' is significant. As the market continues to grow, new entrants will offer innovative world-class solutions at low cost ("Lifelong learning," 1998) – making it impossible for the 'static' or 'complacent' providers to compete. Despite this seeming urgency, professed by many, US Economist ("Lessons of a virtual timetable ,"2001) stresses the dangers of 'jumping on the band-wagon' too soon or without due diligence, explaining that, "The extension of an institution's brand is not without risk. Increasing the number of students who claim to have studied there can damage a university's reputation if those students do not receive the level of teaching that the university's name was built on."

Following on this argument, Pollock and Cornford (2000) acknowledge that in the implementation of eLearning, institutions will bear the risk of destroying those processes that offer important forms of support to students. Ultimately, it is possible that standardising a number of informal support systems will create competitive disadvantage – exactly the opposite to what the process sets out to achieve. Thus, HE institutions need to consider the implications for everyone involved before implementing any new eLearning strategies.

Universities need to consider cost-effective and efficient methods of operation if they are to survive. While technology alone might not be the answer to all of the university's problems, according to Daniel (1996), it certainly can play a key role. The benefits of utilising technology, particularly for developing online collaborative activities are well documented (Redfern & Naughton, 2002). Relationships can also be fostered within the context of an online environment. Technology is a powerful medium particularly for part time work based students who find erratic attendance requirements and study difficult (O'Donoghue & Singh, 2001).

The implications are clearly multi-faceted. The institution will itself necessitate change both physical, cultural and managerial. Students will require support in adapting to a potentially unfamiliar learning context. Finally the implications are immense for staff who are under pressure to introduce and develop often radically different approaches to their teaching and delivery.

Structural Issues for Traditional Universities

Meeting the Changing Demand

The rapid growth in eLearning, experienced particularly during the 1990s, has overcome many of the barriers to Higher Education (National Committee of Enquiry into Higher Education, 2001b), providing traditional universities with an opportunity to meet the changing worldwide demand for education. According to Goddard (1998) the demand for higher education is expanding exponentially throughout the world and by 2025 as many as 150 million people will be seeking Higher Education. This increase in demand is widely attributed to the changing culture of employment, where a job for life is no longer the norm, and to the advent of the so-called 'knowledge-driven society' (Katz, 2001). Society requires higher levels of skills and qualifications to fill the same 'worthwhile' jobs (Davies, 1998), and individuals see education as a status provider (Pritchard & Jones, 1996. Volery and Lord (2000) point to the capacity constraints and resource limitations that can be overcome through the implementation of eLearning, creating a new opportunity to satisfy this growing demand.

The growth in demand will be a transition in the type of students undertaking higher education. The educational needs of individuals are now seen to be continuous throughout a working life, as labour markets demand knowledge and skills that require regular updates. A phenomenon of 'life-long learning' has begun and according to Davies (1998) this new concept is quickly gaining social and political recognition as Governments recognise the positive impact of education on the health and growth of modern economies. Consequently, higher education institutions will be required to provide for a more diverse student body. In particular, eLearning will provide for the significant growth in the mature student market.

A recent report by the National Committee of Enquiry into Higher Education (2001a) reports that currently, more than 50% of HE students are mature students (someone who starts a degree aged 21 or over). This figure is set to increase as online learning and virtual universities allow educational experiences to be tailored to the needs of individuals or groups of individuals. Other social groups, such as those from remote areas, those with family commitments and those with disabilities will also add to the diversity of the new student body as the physical and temporal obstacles to Higher Education are removed with the help of technology (University of Leeds, 2001).

There is significant body of research that argues eLearning is not the only way to meet the changing demand for Higher Education. Hoare (2001) and Education and Training ("Lifelong learning," 1998) propose that modern economies rely on lifelong learning to fulfil demand for new knowledge, abilities and capabilities. However, Cooper (1999) does not believe that eLearning can sufficiently provide lifelong learning for everybody.

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Many of the students of a virtual university will not have the skills to learn independently and, consequently, it is unlikely that they will be successful in an eLearning environment. Instead, foundation courses must be provided locally and delivered face to face for those who need them. Such findings imply that the implementation of eLearning by traditional universities will not be the answer to the problem of changing demand. However, most innovative Higher Education institutions can make use of opportunities derived from technological progress to offer lifelong learning to many, and thus can contribute to the fulfilment of the needs of a diverse consumer base.

The Competitive Environment

The growing diversity of the Higher Education population must be matched by the offerings of universities as students demand more of their knowledge providers. A report by the National Committee of Enquiry into Higher Education (2001a) states. "a system growing and responding to the needs of an increasingly heterogeneous group of students must work actively to maintain its diversity and offer choice to intending students". Volery and Lord (2000) claim that those universities that do not embrace the opportunities presented by technological developments will be left behind in the race for globalisation. Goddard (1998) agrees that the competitive environment is changing, as diversity in demand presents opportunities for new entrants to the market:

Universities have always had rivals, but the provision of learning is increasingly shared between academic and work/community environments. There has recently been a growth in corporate and virtual providers in the UK and abroad, which will pose challenges and opportunities for universities in the future. It is clear that competition and potential collaboration in knowledge provision is becoming increasingly global.

Other research (Currie, 1999; Johnston, 2001; Paton, 2001) echoes Goddard's (1998) view that eLearning provides opportunities for new entrants into the Higher Education market. Goddard proposes that traditional universities implementing eLearning will face competition from two main rivals: corporate universities and virtual universities. Corporate universities present possibly the biggest threat to traditional institutions in their facilitation of lifelong learning. Six UK businesses have now established universities offering qualifications from National Vocational Qualifications (NVQs) to PhDs. According to Hoare (2001), the impact of eLearning on the world of business has been significant, particularly in meeting the needs of 'time poor executives' who cannot be out of the office for five days whilst still running their business. This type of competition represents a challenge for traditional universities. Implementation of an eLearning strategy must offer the same benefits as a corporate university or else be at a competitive disadvantage when recruiting graduates into postgraduate courses. Virtual universities present slightly different competition issues, mainly involving the potential to overcome international boundaries and recruit students from around the world. The University of Phoenix, one of the largest virtual universities in the world has 48,000 students, most of which are in full time work (Goddard, 1998). According to Currie (1999) students will be able to demand learning when and where they want it through virtual universities. As they can and will go to global providers for this, it will become more difficult to protect the reputation of traditional UK providers.

Organisational Structure

For traditional universities, a move towards virtual learning requires a fundamental change in the structure of the institution. A growing number of Higher Education institutions now exist only in cyberspace (Brewer, 1998) whilst for many students, the virtual learning experience is an online learning program sponsored by an established university or in some cases an online module which contributes to a degree that will be completed in a classroom setting. In any case, the transition from one type of structure to another represents an obstacle which must be negotiated with caution. As traditional universities endeavour to move from the didactic classroom or lecture based mode of delivery into technology supported learning, there is a need for academics, managers and policy makers to appreciate need for the changing landscape of higher education. Pollock and Cornford (2000) identify some essence of a possible 'vision' of non-campus based learning activity. "A decrease in the importance of the campus as students login from a distance to access 'courseware', new media technologies replacing traditional lectures, courses being delivered and accessed over the internet, promising to make higher education available anywhere and anytime".

Pollock and Cornford (2000) propose that although visionaries believe that the virtual university solves the 'increasingly demanding problems of higher education', achievement of this vision is unlikely as the virtual university works in theory, but not in practice. Consequently, it is important for universities to understand the problems associated with the transition from traditional to virtual and to take account of such difficulties when making fundamental changes to the structure of the institution.

The Implications of eLearning for Students

Adapting to a Change in Learning Processes

It is widely acknowledged that implementation of eLearning leads to a fundamental shift in learning styles; however research into the effects of this shift is inconclusive. Singh and Priola (2001) summarise a number of opposing views. Firstly, Knight (1996) proposes that eLearning will benefit students who are used to being 'spoon fed' on the basis that students can no longer be passive about their learning. This view is endorsed by Hawkes and Cambre (2000) who claim that in order to gain results, students must take responsibility for their own learning. Secondly, and in contrast to Knight, the views of Kershaw are noted. Kershaw (1996) proposes that students will not automatically become conscientious, self motivated individuals and that success in fact depends on the level of interaction between students and lecturers that is required to stimulate good results. Based on the lack of conclusive evidence relating to the effects of a change in learning style, it seems appropriate to assume that not all students respond well to an eLearning environment. Cooper (1999) points out that independent learners have the potential to be successful in distance education, however those lacking in the skills to study independently will not react well in a virtual environment. Under such circumstances, institutions implementing eLearning must be aware that students will react differently to the changing paradigm of learning and rather than implement changes across the board, should aim to offer courses tailored specifically towards the different learning styles. In failing to take such action, universities run the risk of low success rates and at worst, failure.

Dealing with the Isolation Issue

The issue of isolation caused by eLearning has sparked a rigorous debate amongst researchers. The lack of interaction associated with eLearning is of prime concern to Cooper (1999) who remarks, "electronic contact cannot currently sustain the qualities and multi-dimensionality of the kind of tutor-student relationship that real learning seems to require"(p.xxvi). This opinion is further supported up Bourner and Flowers (1997) who suggest that if technological developments are to be incorporated into higher education, this should be accompanied by increased human contact.

In a recent panel discussion ("Observations," 2001), this view was strongly contradicted by a contributor who pointed out "to suggest that people can't learn without human interaction would suggest that people can't learn anything by reading a book in the quiet of a library". Moore (2000) claims, from experience, that distance learners require a great deal of interaction, although mainly with the purpose of giving reassurance that everything is 'going okay'. According to Michailidou and Economides, (2003) the development of a virtual world motivates students to participate in the educational process by exploring and playing with the lesson material. It can potentially provide an active, independent, student centred and tutor facilitated engagement which enables communication with other students and tutors which may not always be enabled within the traditional classroom setting.

Identification of Critical Success Factors

The critical success factors in an eLearning environment are different to those in a traditional learning environment. As institutions incorporate elements of online learning into degree courses, many are looking in hindsight at the factors that affect the performance of students who enrolled. The findings of such studies are valuable to those institutions planning eLearning strategies.

A common theme in the findings of such studies was that students who have prior experience of using information technology will generally be more successful in a virtual learning environment than those who do not (Volery & Lord, 2000). Shabha (2000) extended this line of reasoning by noting that students over the next ten years will come from a wider age range and background and will have a greater variety of education experience.

As such, as the rate of technological progress gathers momentum the skill gap widens and the level of training needed to catch up becomes deeper, creating an instant hurdle for those lacking the necessary skills and expertise. For new eLearning providers it is important then to accommodate students with little prior experience by offering help. This could be in the form of an initial face to face session teaching students how to access and use courseware and other electronic resources, and could be supplemented with additional help such as 'pop up' boxes in the electronic course material providing students with direction and advice. Volery and Lord (2000) report that the success of the technological infrastructure also has implications for the success of virtual learning, as malfunctioning hardware, software configuration, slow or down servers, busy signals and lack of access are all barriers which can cause frustration for students and ultimately affect the learning process. This issue is difficult to overcome as problems with technology can arise at any time. This challenge is best met by ensuring the functionality of the technological infrastructure before eLearning is implemented.

The lecturer or a course facilitator should be trained as a 'trouble shooter' at a basic level, and be able to resolve elementary hardware and software issues. The instructor is also a major factor contributing to the success of eLearning. According to Webster and Hackley (1997) there are three characteristics of instructors that influence student performance: attitude towards technology; teaching style; and control of the technology. Each of these factors should be taken into account in the identification of suitable lecturers, (Volery & Lord, 2000).

The Importance of Quality Assurance

Quality assurance is a key issue in the implementation of eLearning (Goddard, 2000) as the number of non-accredited institutions offering degrees increases rapidly, damaging the reputation of online learning (University of Houston, 2000). According to Copeland (2001), a number of virtual programmes have thrown up quality concerns, which in turn means that providers of quality eLearning programmes must fight harder for recognition from employers and the wider society. Empirical evidence on the subject of quality is patchy: a 1999 study of 365 examples of distance education identified 'little or no difference' between the qualities of education received from distance learning compared with the classroom (Caudron 2001), however critics of this new phenomenon are not convinced. The measurement of 'quality' is often qualitative rather than quantitative; personal characteristics acquired/required by online students are used to evaluate the quality of e-qualifications. Caudron (2001) suggests it is possible that online students have to be more disciplined and work harder to achieve their goals, thus implying that e-qualifications must be of a high quality because students must have worked hard to attain them. However, whilst measurable skills can be taught effectively in an eLearning environment, online students lack sufficient immersion and interaction to develop qualitative characteristics such as interpersonal skills - these are still better developed in a high quality traditional setting. It is possible that the quality of eLearning will always be in question, however through implementing rigorous controls, institutions can ensure that students are working to attain credible qualifications, as they would be in a traditional learning environment.

Employers and Humans Resource (HR) professionals have also voiced concerns over the quality of e-qualifications. This means that institutions also have to consider the impact of eLearning on the employment prospects of students. According to a study of 269 HR professionals in September 2000, 61% believed that online degrees were not as credible as the traditional qualification (University of Houston, 2001). The major issues for employers are the unknown source of the degree, the lack of student interaction and the high potential for low admission standards into degree courses, says Mark Oldman, co-founder of a New York City career advice firm.

In contrast, some employers place more value in so called 'click and mortar' degrees because they appreciate the hard work, motivation and commitment required to attain a degree online (Caudron, 2001). It is difficult under any circumstances to assess the suitability of a candidate for a job. Students of eLearning institutions should be advised, as are traditional university students, that qualities such as experience, enthusiasm, ideas, ability and organisational fit – as well as the degree – all contribute to their overall attractiveness to potential employers (Cauldron, 2001; University of Houston, 2001). Universities should be aware that the implementation of eLearning has implications for job hunting students, however if research is correct (University of Houston, 2001), 'brand name' institutions will soon realise the potential of eLearning and incorporate it into their own programmes. This in turn will convince HR professionals of the value of online degrees, ensuring that e-students are not at a disadvantage to traditional students.

The Implications of eLearning For Lecturers

Incorporation of New Teaching Styles

In the implementation of eLearning programmes, HE institutions are demanding a change in the role of university lecturers. Traditional teaching and learning skills need to change in order to get maximum benefit from virtual learning (McFadzean, 2001), hence lecturers are posed with the task of developing a new model of effective teaching. Many researchers have attempted to lay down criteria for successful online teaching, although findings are mixed. McFadzean (2001) concentrates on the psychological aspect of learning, purporting a need to shift from behavioural and cognitive approaches (whereby the lecturer controls the learning) to a humanist approach, where learners can take control of their own learning. The humanist approach suggests that the aim of education is to assist students to achieve self-actualisation and consequently the role of the lecturer shifts from information provider to supporter – encouraging students to feed their own curiosity. The key message here is that students are not spoon fed, but rather shown the way. Moore (2001) extends this basic outline by proposing tactics to get learners to successfully take control. This theory involves splitting distance teaching into three phases of activities: preparation, presentation, and participation and cites examples such as, "attend to student motivation and the affective dimension of being a student... but don't intervene too much. Establish the culture of independent learning and peer participation".

This student focussed approach is not supported across the board. Research carried out by Learning Peaks (2001) implies that in an online environment the role of a lecturer focuses more on administration than teaching. The Learning Peaks study proposes that the four core competencies of an online lecturer are administrator, facilitator, technical support and evaluator. The need to overcome barriers to successful learning, such as technology and time and place, shifts the core focus away from the needs of the student, towards simply making sure that the course operates smoothly. Whilst it is clear that administrative factors require consideration and action, it seems inappropriate and inadvisable to take the focus away from students, particularly during a period of significant change. The implications of eLearning for lecturers are significant and should not be overlooked by institutions implementing such programmes. Lecturers must be provided with sufficient time and resources to ensure that online courses are suitably developed and implemented to meet the needs of students. Alongside this, the transition into new teaching styles must be managed effectively to ensure that lecturers are supported through and beyond the evolutionary period.

Accommodating Changes in Workload

Extensive dialogue over the changing role of lecturers has naturally led to concern about the associated changes in workload. Moore (2000) stresses the importance of this pedagogical and political issue and points out that as more lecturers are required to teach in a virtual environment the question of workload climbs ever closer to the top of the distance education agenda. At its simplest, the answer to the workload question might depend on the propensity of the institution to employ online teaching and moreover, how well the delivery is organised. However, going further it is clear that numerous factors contribute to the workload of a distance teacher, from the amount of time spent authoring the material, to the level of interaction between student and lecturer. Moore (2000) points out that the issue of workload is directly underpinned by the issue of quality and proposes a minimum 'ballpark' ratio of 50:1, design time to contact time, as well as significant interaction between student and lecturer. This, he purports, will "pay off handsomely in the quality of the learning experience and ultimately the success of the program".

Empirical research into the workload question presents mixed findings and any comparisons must be made carefully due to differences between the various cases that have been studied. Two studies, carried out in 2000 analysed the time taken to teach a course online compared with teaching it in a traditional classroom (Moore, 2000). The findings of the two studies were contradictory. The first reported that distance lecturers experienced a reduced workload: 2.7 hours per student compared to 3.2 hours in a conventional setting, whilst according to the second study, lecturers needed nearly twice as much time to teach an online course compared with a traditional course. This contradiction can be explained by the many differences between the studies, including the subject, student's educational backgrounds and the mix of technologies, thus limiting the generalisability of the comparison, except to highlight that many factors contribute to the workload issue.

That is not to say that the studies themselves are not of value – it is very important to analyse cases on an individual basis to identify those variables which contribute to the workload, but also those which contribute to the success of the course. This in turn will allow eLearning providers to ensure that adequate resources are being provided, but that they are also being used effectively.

If the provision of eLearning is to become a key element of university education, employers will need to provide a major programme of staff development and training (Copeland, 2001). Training and support is required to ensure that technology can be integrated into daily routines and that its use will be efficient and effective (Wilson, 2001). However, this too will add to workload pressure, particularly for those requiring significant training due to a lack of experience. This pressure is augmented by the continual need for retraining as lecturers struggle to keep up to date with technological progress and since familiarity with technology has a direct impact on the success of online courses, the importance of training cannot be overstressed.

Summary

Growth in eLearning is rapid as institutions race to compete for a share of the increased and changing demand for HE. Research suggests that universities failing to embrace technological progress made during the 1990s will be unable to meet the needs of knowledge based societies and as a result will not survive the change in the paradigm of education. However, the implementation of eLearning brings forth implications for all stakeholders in HE, and poses a number of risks which can not be overlooked.

ELearning has a fundamental impact on the structure of HE. Whilst the growth in demand can be accommodated by its implementation, the diversity of the new student population requires that institutions carefully develop programmes that will satisfy a broad range of learning requirements. This challenge is intensified by changes to the competitive environment where, in the wake of lifelong learning, traditional institutions are competing with corporate and virtual universities particularly for the mature student population.

Students are also greatly affected by the implementation of eLearning, principally by the shift in learning styles required to be successful in an online environment. Universities should be aware that dependent learners will require courses tailored to suit their educational needs, potentially offering a blend of face to face and virtual interaction. Failure to provide for these needs will lead students to shop elsewhere.

There is a need to acknowledge that active learning within a technologically based environment necessitates the establishment of a theoretical framework as part of the learning process, (Manning, Cohen & DeMichiell, 2003). This realisation will mean that the use of technology is not about replacing learner process, but enhancement and extension of such. This is most important if we are not to simply 'cut and paste' content, which may have worked in the lecture theatre, in virtual and technology based learning environments.

The critical factors for success will change with the implementation of eLearning programmes: prior experience of using technology; the technological infrastructure; and the lecturer will be the new key elements in the success of the learning experience. HE institutions can help students to achieve success by doing three things. Firstly, a face-to-face session familiarising students with the courseware will help to overcome the issue of prior experience. Secondly, the functionality of the technological infrastructure should be ensured before the course is implemented. This should be backed up by technical support from either the lecturer or a course facilitator. Finally, human resources should be committed to the project at an early stage and lecturers should be selected based on their attitude towards technology, teaching style and ability to control to technology.

For lecturers, eLearning programmes represent a change in teaching style. The precise nature of the change is difficult to quantify, however allocation of sufficient time and resources, combined with managerial support, will help staff through the period of transition. Effective management can also help institutions to deal with any increase in lecturer workload by ensuring efficient use of resources

ELearning offers HE institutions all the benefits of a global consumer base. In order to reap these benefits, universities should carefully assess the implications of eLearning. Programmes should be of high quality and should meet the needs of the diverse student population. This should ensure the success of eLearning into the future, providing institutions with a much needed competitive edge.

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A Study of Social-Learning Networks of Students Studying an Online Programme.[14]

Gurmak Singh
John O'Donoghue

Abstract

This paper reports the findings of a research project exploring the socio-learning environment of students studying online programmes. The findings point to the key areas of conflict between the developed online teaching and learning systems and the socio-learning environment of the learners. The contention of the paper is that whilst current frameworks provide useful insights into the socio-learning environments of the learners, many important aspects have not been fully explored. The findings support and build on studies which propose that the level of online interaction received by students is indicative of the success of the learning process. Furthermore, the differing levels of interaction aid learners to consolidate their knowledge by communication with academic support groups, tutors, family and friends.

The findings are reported using the social network theory specifically addressing four levels of relationships. The first level considers the learning relationships between the academic tutors and the learners. The second level explores the interaction between the learners and other parts of the institutions, such as learning centre staff and pastoral care counsellors. The third level relationships are between the different learners and the fourth level relationships are between learners and the outer community, such as friends and family members.

1. Introduction

Over the last decade there has been a significant increase in the use of information communication technologies in higher education institutions. The advantages of computer-mediated learning environments over traditional approaches have been well documented; incorporation of individual learning strategies (Paterson and Rosbottom, 1995) shift the degree of control to learners (Naidu, Barrett and Olsen, 1995) encouraging active learning flexible delivery and a learner-centred approach . Online interactivity through computer technology has already received much attention from educators (Harasim et al., 1995; Mason & Kaye 1989; Berge and Collins, 1995). Compared with face-to-face interaction, online interaction is usually asynchronous and hence adds the benefit of being more reflective. While it lacks the uses of the face-to-face context, and the immediacy of feedback of synchronous communication, it does create a record of the interactions in a series of messages which can be re-read and even quoted in assignments (Mason, 1998). During this period there has been shift in focus from the individual towards a new emphasis on social contexts for learning in terms of collaboration and co-operation (Glaser, 1990; Kaye, 1992; Fowler 1999). There is a growing recognition that much of the learning may occur outside the formal classroom environment. Fowler and Mayes (1997) refers to this 'out-of-classroom' learning as situated learning. There are many views on situativity. Lave and Wenger (1991) emphasise a wider social context exploring relationships between the wider identifiable groups of people. For situated learning the increased interactions amongst learners, groups of learners, instructors and tutors is provided by electronic communications supported by learning technologies. Such environments have been shown to enhance learning outcomes in many different ways, including improvement in the quantity and quality of the learning experience (Grabinger, 1995). Furthermore, such technological environments remove the logistical problems encountered by traditional approaches and improve collaboration between learners. Whilst online technologies offer many perceived benefits they will not in themselves improve or cause changes in learning. What improves learning is well-designed instruction (Paterson and Rosbottom, 1995) and learners who are used to working independently, and who have personal motivation to learn. More recently, Fowler and Mayes (1999) emphasised social network theory to explain and model learning relationships. They recognised three types of relationships: explorative, where learning is about discovery; formative learning, the building of understanding through guided activity; and comparative, where the learner becomes an accepted member of the community.

The aim of the research project is to explore the nature of social relationships of learners using Fowler and Maye's (1999) framework. These insights are used to develop a theoretical model that identifies the nature of the relationships by identifying their dimensions. The research method involves investigation of a single - referred to as intrinsic case study by Stake (1995). The case is examined in detail, its contexts scrutinised, its activities investigated.

Five exploratory group interviews were carried out with sixteen respondents. The main aim was to develop an understanding of the meanings attached to learner experiences in an online environment. Respondents were asked to share their experiences, to describe whatever events seemed significant to them, and to provide their own definitions of their situations. The second interviews were semi-structured with twenty-one respondents. These were designed to explore the causality of relationships among the concepts identified in the first interviews. The key anchor themes were identified from the raw causal statements. The concepts mentioned frequently were grouped together into the framework identified by Fowler and Mayes (1999).

2. Details of the case

The Wolverhampton Open Learning Framework (WOLF) is a purpose built computer based learning environment developed by the University of Wolverhampton. Through close consultation between academic staff and developers, an integrated system has evolved which enables students to access course notes, related resources, support materials and collaborative tools quickly and easily.

The WOLF system uses streamed Internet based technology to bring together a wide range of powerful tools to create a multi-structured aid to learning. One copy of all learning material and associated resources is stored centrally and streamed to any user with access to the Internet, on demand. The key feature here, apart from being available when needed by the user, is the simplicity in updating and amending material, given only one copy is kept. Freeing lecturers from their previous paper chase ensures that all students on the course have the 'correct' learning and assessment materials. Lecturers are free to keep improving the learning environment and adding to the learning materials. It is based on the simple acceptance of "Anytime, Anywhere Study". The development of content involves no programming (HTML etc.), which means that lecturers can update their material themselves or submit it electronically to a course administrator.

3. Profile of Respondents

The respondents were predominantly mature students: 7 male and 14 females with an average age of 26. They came from a variety of disciplines and possessed a range of educational qualifications. All were studying part-time and most had been with their organisations for just over three years. All had received training of using the online system. The study was undertaken in autumn semester 1999 with part-time students in their final year Business Administration Award.

4. First Order Relationships: Tutor and Student

Whilst the relationship with tutors was considered to be essential for effective learning, respondents claim it varied depending on the teaching methods of the tutor, assessment task and the learning material available. Furthermore, they claimed that in the majority of cases the course material available on the system appeared to be designed to replace textbooks and lecture notes. The online system provided all the necessary material (module guides, assessment, lecture notes and references to key reading material) in an easily accessible form using this approach. Perhaps surprisingly, learners were comfortable with this approach as it was easier for them to translate their expectations of a traditional approach to the 'online' system. The tutor-learner communication mainly occurred when the students needed re-assurances and guidance on the requirements of the assessment. Communication in this context was one-way, static and 'on-demand'. Learners suggested that the tutors replied to their queries in-depth but the response sometimes took over three to four days and by that time the other avenues had been found. Learners suggested that whilst tutors were keen to help them with the assessment task they were not always so forthcoming trying to 'teach across the wire'. The advantages of working in your own time, at your pace, without the need for irrelevant material outweighed the need for learning experience. This 'outcome' based approach was evident in students and tutors.

5. Second order relationships: Student and Student

All students agreed that the majority of their time was spent on completing their assessment through group interaction, even when the assessment was an individual piece of work. The individual tasks offered advantages in that there was no reliance on other group members, however the learners complained it did create a *'feeling of isolation'* and *'working in the dark'*. To overcome this remoteness the learners chose to discuss their progress with their tutor-group. Initially, the interaction was difficult as the learners did not know each other, but once relationships were built they became vital in all aspects of their study. Initially all emails were copied to all group members but later in the course selective relationships were built.

These group members became aware of each others' working patterns and knew when to expect replies to their communications. Learners were prepared to share material that they found, discuss the progress they had made but, not surprisingly, were reluctant to share their final work. Some learners suggested that there was pressure to circulate their work to group members and, in some cases, had done so to remain a legitimate member of the group. Whilst in other groups there was a feeling of shared responsibility to help colleagues; success was measured by group success even with individual assessments. Each member felt they had a role to fulfil within the group in order to justify their position in the group even though this meant taking on extra tasks.

This strong group membership resulted in an absence of clear assessment criteria. The learners came to a consensus and decided themselves the requirements of the assessment. Such group decision-making was seen as vital and the decision reached as the agreed 'absolute'.

6. Third order relationships: Student and Other University Units

The designated 'course buddy' allowed the learners to contact a *'human-being'* when problems arose or clarifications were required. The form of communication was informative in that students required guidance on 'where to get information' and 'who to contact'. The accessibility was the key issue; learners wanted a person on the other side of the phone line 9-to-5. The Course Manager, who was involved in other activities and frequently away from the office, could not provide the service required.

The learning centre was a key resource as most assessment tasks required some form of research. Learners suggested that as part-time working students they did not have large amounts of time to spend seeking information in the learning centre. So, although the learning centre had staff available all the time, it was important for the learners to identify a key person with whom they could build some form of rapport. This would result in a more personalised service where the learning centre staff would recognise them and be aware of their needs without having to repeat the process every time they made contact.

7. Fourth order relationships: Students and Wider Society

Whilst learners were able to share much of the material with their group members they did not think it appropriate to share their final [individual] assessments. Work colleagues who specialised in specific functions, such as IT, Marketing and Human Resources were used to feedback on completed and draft versions. The form of feedback generally resulted in the 'final check' before submission of the assessment. Most learners agreed that they did not receive any extra help from their work colleagues, but their involvement reassured them that they had not omitted any key issues. Many students also suggested they used members of their family to read through their work.

First Level	Second level	Third Level	Fourth Level
Communication *(formative)*	Social environment *(formative)*	Routing information (formative)	Specialist guidance (comparative)
Learning experience *(formative)*	Group Membership (comparative)	Instant access (	Use of IT
Feedback *(formative)*	Accountability (comparative)	Focused guidance *(formative)*	Verification (formative)
Variances in approaches	Confirmation *(formative)*		

8. Discussions

The students are perhaps more aware of the change in learning environments when using learning technologies than their tutors. This is not surprising as research suggests that learners select such approaches because the method fits their circumstances and they have the appropriate communication and motivation skills. The issue is three-fold. First, there is a need to raise awareness amongst tutors of where and when learning occurs, certainly not in the classroom and not solely through tutor-student interactions.

The most disturbing finding was that students adopt alternative learning strategies when the designed infrastructure fails. Second, although social learning research has made significant steps forward, it is in vain unless it becomes an implicit part of the teaching and learning strategies of the online systems. Third, the learning technologies are particularly useful for part-time mature students who are self-motivated and self-disciplined but they need assurances, especially in the early stages, from the human tutor.

The findings suggest that learning may take place in a wider context than suggested by the Fowler and Mayes (1999) model. First order relationships appear to be the most explorative focused where the learners are establishing the boundaries and context of their learning. In this context the relationship between the learner and the tutor is passive in that the latter provides the information and the former collects as much information as possible. In the second order relationships there is more formative learning between the learners. Initially the relationships are fragmented and cautious but later these become more selective and comparative.

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A Study into the Effects of eLearning on Higher Education.[15]

Gurmak Singh
John O'Donoghue
Harvey Worton

Abstract

The Internet is a technological development that has the potential to change not only the way society retains and accesses knowledge but also to transform and restructure traditional models of higher education, particularly the delivery and interaction in and with course materials and associated resources. Utilising the Internet to deliver eLearning initiatives has created expectations both in the business market and in higher education institutions. Indeed, eLearning has enabled universities to expand on their current geographical reach, to capitalise on new prospective students and to establish themselves as global educational providers. This paper examines the issues surrounding the implementation of eLearning into higher education, including the structure and delivery of higher education, the implications to both students and lecturers and the global impact on society.

INTRODUCTION

ELearning is construed in a variety of contexts, such as distance learning, online learning and networked learning (Wilson 2001). In the context of this paper all of these instances will be considered to describe learning that utilises information communications technology (ICT) to promote educational interaction between students, lecturers and learning communities (Holley 2002). Volery (2000) argues that the fast expansion of the Internet and related technological advancements, in conjunction with limited budgets and social demands for improved access to higher education, has produced a substantial incentive for universities to introduce eLearning courses. Volery (2000) continues, that if universities do not embrace eLearning technology that is readily available, they will be left behind in the pursuit for globalisation. Ribiero (2002) argues that if universities are to maximise the potential of eLearning as a means of delivering higher education, they must be fully aware of the critical success factors concerned with introducing online models of education.

Many commentators describe the relative benefits of eLearning in higher education, however, there are ramifications for unprepared, technology focused institutions, when trying to implement distance learning courses. O'Hearn (2000), contends that university structures are rigid and unproven, regarding the incorporation of technological advancements. Holley (2000) states that eLearning is difficult to implement without the full cooperation and support of lecturers, as the degree of interaction between lecturers and students is still predominant in eLearning environments (Volery 2000). Finally, are traditional universities able to compete with other independent education providers in relation to social demands for 'life long learning' and globalised education services? (O'Hearn 2000).

The Organisational Structure of Universities

Over the past decade the structure of higher educational institutions has changed, partly due to the introduction of technological initiatives. Scott (2000) supports this opinion and contends that as eLearning is now facilitating a more flexible learning approach, contemporary institutional structures are less robust than in previous years. In addition, Shaba (2000) states that technology in general has not only improved knowledge storing methods and learning techniques but has also acted as a catalyst to combat the barrier of inflexible organisational structures. This view suggests that to fully experience the benefits of technological advancements in higher education, such as eLearning, universities must have flexible organisational structures. According to Scott (2000), the structure of today's universities must be 'changeable' in order to integrate distance learning courses, and those institutions that will not or cannot change their structure to incorporate this technology may be bypassed by other educational providers, such as virtual universities and independent educational services. It might well be the case that corporate universities which hitherto only offered training to its employees will be in competition with the higher education sector.

Darling (2002) argues that such a wide acceptance of eLearning methods in higher educational institutions will create broader repercussions regarding organisational structure. This point is illustrated by Shaba (2000) who suggests that universities are currently inexperienced concerning the acceptance and incorporation of eLearning and other technological changes into their organisational structures.

Shaba (2000) considers that this lack of experience will initiate the following reactions within universities. Firstly, ambiguity towards future technology strategy and how to incorporate new technological advancements into organisational structure and secondly, how to cope with the diverse range of teaching courses and learning programmes ongoing within the university comprising of full time and part time students. Shapiro (2000), suggests one of the challenges facing traditional universities intending to transform organisational structure to incorporate technological innovations is coming to terms with the process design for distance learning courses, without ignoring the organisational, managerial and financial constraints.

Although advocates of traditional approaches to higher education may argue that courses should be taught in fixed locations using somewhat rigid organisational structures, the opinions of many writers suggest that eLearning methods will greatly change future higher educational systems. Volery (2000) describes how the broadening geographic distribution, flexible learning environments and variety of educational models that are offered by distance learning facilitate improved education, and if universities do not embrace this technology they will be left behind in the pursuit for globalisation and technological development.

The impact of eLearning initiatives will have direct effects on the future structure of universities on both strategic and tactical levels (Shaba 2000). Strategically, universities will experience issues concerning face to face versus virtual environments, how many buildings to keep and most importantly whether to maintain the existing organisational framework. On a tactical level, the changing role of lecturers, the changeable learning environment and the design of eLearning facilities will all contribute to a potentially more flexible organisational structure. Despite the apparent dysfunctional effects the implementation of distance learning techniques can assert on university structure, O'Hearn (2000) adds that contemporary university structures must be changeable and adaptable, able to embrace new learning and communications technology offered through eLearning, or face the consequence of limiting students direct access to global knowledge repositories that have the ability to extend higher education.

Higher Educational Institutions links with Industry

Researchers have indicated that a more business-focused approach to higher education in conjunction with improved technology has resulted in an increased number of university to business alliances. Henry (2002) explains that in today's information age traditional universities must compete with other educational providers, such as education centres and corporate universities, if they are to attract and retain suitable students. In contrast, whilst such alternative educational sources are expanding steadily, traditional universities should distance themselves from these developments and concentrate more on internal progress and improvement (Shapiro 2000). Fry (2001) offers that universities are driven to eLearning as a marketing tactic to attract part time students and to maintain market position, and the rise of alliances with other organisations is inevitable due to social demands for knowledge and the lack of public and government funding in higher education.

The range of eLearning providers is broadening rapidly and Henry (2002) suggests that the number of corporate universities may outnumber traditional universities within five years. Teare (2000) debates the credibility of such corporate universities, which offer product specific training within a number of disciplines, and believes that they only seek alliances with traditional universities in an attempt to take advantage of universities respected reputations. While traditional higher education institutions endeavour to learn more about implementing eLearning from external organisations, they are extremely cautious with regards to connecting themselves to potentially precarious organisations (Dobbs 2000). Due to social demands for flexible learning, the business marketplace is now progressing on the more traditional realms of higher education (Teare 2000), and if traditional institutions are to remain a dominant education provider and advance technically they must embrace the knowledge and experience of external clients in the latest distance learning revolution (Jones 2000).

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Incorporating ELearning in Organisational Strategy

Fry (2001) expresses the view that if universities are to compete in a global higher education market they must embrace the technological advancements and use them as a strategic tool, capable of transforming educational and business practices. Fry (2001) considers that eLearning initiatives will not only give universities a new channel of educational deployment, they will also support strategic objectives by assisting asynchronous discussion consortiums and networked communities. It may be that eLearning strategies within universities could be orientated around technological capabilities.

Darling (2002) opposes this assumption and contributes that higher educational institutions should not be influenced by features and functionality of software, instead of focusing on eLearning as a tool to support learning. Darling (2002) further advocates that eLearning is a valuable strategic business tool, that when implemented 'properly' could modernise higher education, but when deciding an effective strategy it is imperative to consider that distance learning is a means to an end, not the end itself.

Hartley (2000) details that any university incorporating eLearning initiatives into organisational strategy must take into consideration the following; the financial constraints of the strategy, suitability of the technology, implementation of the technology and the range of eLearning requirements within the institution. If sufficient attention is given to all these considerations, the university is in control of it's distance learning future (Hartley 2000). Darling (2002) asserts that a number of established universities are embracing the use of technology in higher education, especially in distance learning disciplines, without understanding or addressing the business or educational requirements. In the opinion of Shapiro (2000) this could be fatal for universities, who must not let fundamental educational processes be overshadowed by the implementation of new information technology strategy. The inference is that universities which do not incorporate eLearning effectively as part of an overall learning strategy will do so at the expense of survival.

The above considered a variety of views regarding the effect and potential effect eLearning can have on universities as organisations. The use of advanced technology in higher educational is inevitable (O'Donoghue, Singh and Dorward, 2001), it will contribute to the demise of communicational, geographical and inflexible learning boundaries. Henry (2002) remarks that when organisations participate in restructuring internal processes, eLearning will assist in optimising business processes and will eradicate inefficiencies through shared knowledge and improved communication between departments and employees. To be successful within any organisation, the evidence suggests that eLearning must be implemented as part of an organisational strategy to support learning. Shapiro (2000) argues that eLearning requires systematic implementation and if not structured properly could lead to chaos. Darling (2002) states that for higher educational institutions, an effective strategy does not assure success, as the technical issues in distance learning delivery will always be significant. Perhaps, this point highlights the inexperience of universities with regards to incorporating technology effectively, and justifies the need for external partnerships and alliances. This is particularly so for aspects of infrastructure and internal change management structures. This view is supported by Teare (2000) who comments that through alliances with organisations, eLearning course material can be designed to challenge students in real business situations in addition to underpinning academic endeavour. Rather than a paradigm shift to an online model, a delicate balance needs to be established between the more formal traditional structures and procedures of the university and the new administrative functions required to rapidly respond to changes in the online education market and ensure competitive advantage and ultimate survival of the virtual campus.

The Role of Teaching Staff

The dynamic nature of the IT industry in conjunction with evolving eLearning technologies has created a tension for lecturers in higher education. ELearning initiatives have reportedly created new educational issues for lecturers, such as changing work patterns and in some cases the reluctant integration of technology. Serwatka (2002) argues that sometimes student success can be achieved simply by preventing student withdrawals from eLearning programmes. The teaching techniques used by lecturers in traditional courses may also have to be reviewed and modified, as they do not always prove effective or necessarily transferable in eLearning environments (Serwatka 2002). Lecturers in networked learning environments modify their courses as they go along, meaning the longer a course is taught in a particular format the more effective it is (Volery 2000).

Many suggest that rather than changing the role of the lecturer, it will gradually disappear completely with the rise of improved eLearning technologies and methodologies. At Carnegie Mellon University (CMU) in America they exercise the concept of a 'wired campus', in which all students learn in a number of disciplines via eLearning. At CMU the traditional lecturer is considered a relic of the past that should be replaced by electronic tutors. Scott (2000) explains how in the future these electronic tutors at CMU will act as virtual teachers, if students make a mistake the tutor will be informed automatically and will offer helpful hints.

Scott (2000) argues that virtual tutors will out perform traditional face to face techniques because in traditional lectures vital information flows past students, whereas the virtual tutor can wait until a student demonstrates a clear understanding of the information or knowledge repository. Rigid information management mechanisms which incorporate tutor invention and involvement must be facilitated in a variety of ways, as they would within the contexts of class based activity.

Volery (2000) maintains that technical expertise on its own is not of great value unless lecturers conceive effective ways to utilise it. Lecturers will always play a key role in the effective delivery of eLearning initiatives, as it is the lecturer not the technology that facilitates the students learning experience. Wilson (2001) suggests that three characteristics of the lecturer will control the degree of learning; attitude towards technology, teaching style and the control of technology. In support of this view Holley (2002) concludes that students will experience a more positive learning experience if guided by a lecturer who retains a positive attitude towards traditional learning whilst promoting eLearning methods. The accepted acronym for such exposure being called 'Blended Learning'. Blended learning is an important building block of the new schoolhouse that offers students both flexibility and convenience, important characteristics for working adults who decide to pursue postsecondary degrees. Blended learning is a hybrid of traditional face to face and online learning so that instruction occurs both in the classroom and online, and where the online component becomes a natural extension of traditional classroom learning (Colis and Moonen 2001).

Enhanced Teaching Tools
The future delivery of education is envisaged through eLearning technology providing lecturers with superior teaching tools. Volery (2000) argues that online methods facilitate more effective education and offer significant advantages over traditional teaching methods. This can be via full blown technological implementation or limited technology based environments such as bulletin boards, virtual lectures and eLibraries. McClelland (2001) contends that in eLearning environments lecturers can offer constant educational support, as students are able to communicate with classmates and lecturers, visit web sites and view course material regardless of their time and location. To maximise the potential of eLearning teaching tools Holley (2000) advocates two methods to modify the learning process. Firstly, educational re-engineering that will revolutionise classroom practices and secondly educational fortification that will improve the learning courseware through technology.

Despite the apparent advantages of eLearning teaching tools there appear to be certain practical problems with regard to utilising these techniques in educational learning environments. Teare (2000) explains that initially the process of teaching via eLearning may demonstrate features of educational enrichment but in reality eLearning methods prove highly problematic. Teare's (2000) studies suggested that some students who participated in online learning courses found the delivery of course content impractical and frustrating due to technological failures. These finding's imply that the problems with eLearning initiatives are not the value of the delivery methods but the reliability of the technology supporting them. Volery (2000) identified that university students who participated in Virtual lectures found the experience rewarding and rated them as a valuable learning tool. However, nearly two thirds of the students in the class did not participate fully because of technical problems i.e. frustrations in trying to connect and utilise the networked systems.

It seems that the teaching tools associated with eLearning may have the potential to equip lecturers in higher education with flexible channels and a model for the delivery of courses. Web based learning allows lecturers to disseminate up to date course content in relatively no time at all and students can complete courses just-in-time, giving them the opportunity to apply knowledge in contemporary situations (Teare 2000). ELearning courses can be structured and aligned with the requirements of today's workforce (Volery 2000). Also, teaching methods such as virtual lectures, sustain group interaction whilst broadening the flexibility of communication between students, indicating that eLearning teaching methods enhance student interaction and offer a flexible alternative to traditional time and place constraints (Holley 2000). However, many authors debate eLearning programmes regarding the reliability of technology versus the apparent advantages of learning delivery methods. Perhaps the reported technological failures are simply teething problems in the early life of the eLearning revolution and whilst there will always be fundamental problems integrating computers with humans in education (Scott 2000) the teaching techniques in eLearning offer lecturers enhanced teaching tools that are capable of moving higher education into the information age.

Training Staff in eLearning Techniques
Recent studies indicate that the success of eLearning methods in higher education can only be measured according to the effectiveness of delivery, training staff may be regarded as a major challenge in the adoption of eLearning initiatives. It is acknowledged that some academics working in higher education are reluctant in accepting aspects of technology in their teaching and learning. Charlesworth (2002) adds that contemporary lecturers are not resistant to training in the use of technological applications, they are simply confused as to how to implement such into lectures or more formal teaching methods. Lecturers that enter the profession in today's information age are much more likely to have used computers and have significant access to the Internet than those in previous years and are more likely to accept technological advances in teaching methods. (Wilson 2001). Academics are often encouraged to "go online" by their institution, by either moving or supplementing teaching in an online environment. This could simply be attempting to replicate face to face teaching, in effect changing nothing; enhancing face to face teaching with the available technology; or transforming face to face teaching by the available technology. The approach chosen will be determined by several factors, one of which will be existing knowledge of the technological environment being used (Coldwell 2003)

Educators must be involved in all stages of eLearning course development, including determining the prospective audience, the purpose of the learning programme and the best format (Shank 2002). This view highlights the requirement for lecturers not only to be trained how to apply eLearning technology in higher education but also be attentive of the theories behind distance based learning. Proficient training includes both technical and conceptual issues, and if executed correctly will generate increased support for the merits of eLearning (Shapiro 2000). Lecturers must possess the appropriate facilitation skills if eLearning courses are to be successful. Shank (2002) argues that facilitation skills fall into three sections, facilitating real time events, moderating online discussions and coaching students. Shank (2002) continues, that if lecturers do not maintain a high level of facilitation skills, even the most effectively designed eLearning courses will be unsuccessful through inattention on behalf of the lecturer.

The evidence suggests that staff training is a central concern for universities implementing distance learning methods. It is essential that the opportunity to redesign and improve university teaching practises through eLearning is not usurped by a focus on training lecturers how to use the hardware and software (Shapiro 2000). Inadequately trained lecturers using eLearning in educational environments can become an obstacle in a finely balanced learning process and can lead to problems in application use and in the perception of students (Volery 2000). In contrast to traditional teaching skills, eLearning requires lecturers themselves to be committed to a constant and changing learning curve, which may involve an mixture of formal training courses in conjunction with conferences and other less formal techniques, if they are to acquire and develop the skills needed to be an effective eLearning tutor (Shank 2000).

Lecturers in higher educational institutions must accept and embrace technological advancements offered by eLearning. Holley (2002) explains that lecturers have to adopt new educational approaches in order to maintain the quality of courses. Collectively, the evidence offered on the role of lecturing staff in contemporary eLearning courses suggests that online learning should not be regarded as an alternative to a traditional tutor. Effective eLearning programmes use lecturing staff combined with the appropriate technology to deliver effective learning. In addition, the lecturer is not only the knowledge source but is

also a knowledge navigator using the Internet as a teaching tool. This enables lecturers to transfer their skills in other business areas such as developing training and corporate courses (Ribiero 2002).

The Learning Environment

There is a notion that an eLearning environment offers students an improved learning experience when compared to a more traditional learning environment. Holley (2002) found that student participants on eLearning university courses using techniques such as virtual lectures and bulletin boards, achieved better grades than students who studied in traditional learning settings. Hartley (2000) maintains that the constraints of conventional university teaching practises with regards to group working are removed in eLearning environments, as students can participate in group activities without actually being situated in the same location. Indeed alternative relationships are developed within the context of an online community (O'Donoghue and Singh, 2001). This supports the view that eLearning environments loosen the time and space restrictions associated with traditional university practises. However, although eLearning environments overcome the traditional time and space constraints, universities must be cautious when deciding if distance learning environments should replace the traditional methods, as students recognise the benefits of the eLearning environments but only when combined with traditional formats (Serwatka 2002).

Many writers propose that the current significant limitations of eLearning environments are not exposed by contemporary research. O'Connell (2002) proposes that students from non-technical backgrounds or those who are more accustomed to traditional face to face learning environments, experience problems absorbing course material in eLearning environments. Similarly, Holley (2002) suggests that even undergraduate students who are perhaps more assertive and motivated should be given focused training on how they can take full advantage of eLearning environments. IT skills can prove problematic for students on distance learning courses and if the requirement for training is not addressed, students will not experience the full benefits of the eLearning environment (Holley 2002). Furthermore, a lack of IT skills is one of the main reasons for student non-participation in eLearning courses (Wilson 2001). Whilst not looking to replace 'real' paper with technology based resource, it is the process of augmentation and enhancement with the 'traditional' resources to enable reflection, encapsulation, consolidation and extension of the written word.

Student Performance

The above suggests that students enrolled on eLearning courses perform better than those on more traditional schemes. It is important to clarify that in the context of this paper student performance considers the level and quality of learning outcomes as well as the student's grades in assessments. Lieberman (2002) explains that in higher education student participation is a primary feature of enhanced performance and in distance learning courses students are more likely to participate in class discussions and group work than in traditional lectures, as they are given more time to prepare questions and responses. O'Connell (2002) argues that quieter students will still be excluded from virtual discussions, as there will always be students who will monopolise conversations, even online! Also, controlling dominant students is far more difficult in eLearning environments when compared to face to face lectures (O'Connell 2002).

There is evidence to suggest that eLearning university students outperform those on traditional courses. Scott (2000) uses the example of Carnegie Mellon University (CMU) in America, where eLearning techniques have not only improved student exam results but have acted as educational bridges between subjects, breaking the ancient boundaries between disciplines. In addition, CMU students participate in eLearning initiatives that allow them to control their own company in a virtual working environment, students analyse competitors business plans, track the performance of their company and even trade virtual stocks. Students, full time and part time, would not acquire this valuable experience in case studies and traditional lectures (Scott 2000). The inference is that higher education institutions which utilise effective eLearning methods not only enhance the performance of students in assessments but also produce graduates who are theoretically and practically prepared for working in an information age (Holley 2002).

Accessibility for Students

One of the most valuable attributes of eLearning techniques and delivery are that they potentially give students greater access to education, in comparison to more traditional less flexible educational methods. Writers such as Hemsley (2002) express the view that full time and part time students can now partake in their chosen degree courses from any location, giving people who travel or who are relocated, a transferable and easily accessible learning resource and experience. Through the use of advanced technology, students who have previously not had access to higher education now have the opportunity to study at the location that best suits their needs (Sadler-Smith 2000). ELearning offers people with disabilities the opportunity to further their education from home (Brown, Cromby and Staden 2001). Although the views expressed propose the positive aspects of home working, there is still evidence to suggest that students who learn from their most convenient location will not engage in a positive learning experience. Home access to education may seem a positive way forward but the learning process is often disrupted, as the surroundings are not necessarily conducive to study (Shaba 2000).

If eLearning offers students greater access to higher education, it is necessary to consider not only access to education but also the access to technology, as computers are an indispensable element of effective eLearning courses (Ribiero 2002). Students who have access to networked computers may have the opportunity to experience a more flexible learning process but students and indeed higher educational institutions could fail to benefit from this opportunity, due to students not being able to afford or gain access to a computer (Shaba 2002). Therefore, students with no computer at home are maybe disadvantaged in eLearning environments. In addition, as a major consequence of an increased participation in higher education, a large number of students originate from low income backgrounds and will have little disposable income to purchase computers (Holley 2002), therefore increased reliance on technology to deliver higher education may potentially lead to further divisions in society (Shaba 2002).

Untimely eLearning initiatives create unproductive learning environments in which students encounter difficulties with course material, are unsure how to prepare for online assessments and are reluctant to contact lecturers for assistance (Serwatka 2002). A major challenge for contemporary universities is to offer students a more client orientated educational programme (Hartley 2000) and this requires an educational understanding of the students need for a more flexible, easily accessible learning environment, which can be offered through distance learning (Fry 2001). Moreover, contemporary learners need to communicate and require the ability to share knowledge and skills from distance, therefore networked initiatives that are technically satisfactory and are highly personal offer students and universities the opportunity to customise the learning environment (Hemsley 2002).

The Concept of 'Life Long Learning'

The development of eLearning methods have brought with them the concept of 'life long learning'. Although it is fair to say that lifelong learning is hardly a recent phenomena. John Henry 'Cardinal' Newman circa 1850, in an address made in the 17th Century (with apologies for the limited gender definition):

> "....He (man) profits by an intellectual tradition, which is independent of particular teachers, which guides him in his choice of subjects.... He apprehends the great outlines of knowledge, the principles on which it rests, the scale of its parts.... Hence it is that his education is called "liberal." A habit of mind is formed which lasts through life, of which the attributes are freedom, equitableness, calmness, moderation, and wisdom...."

The notion that education finishes when someone enters the workplace or reaches a certain age is dispelled by the introduction of eLearning techniques and the provision of an opportunity to access teaching and learning resources remotely. Holley (2002), explains that the opportunities given by eLearning, such as the removal of time and location constraints, offer all people in society the potential to be life long learners whatever their location, age or occupation. In addition Serwatka (2002), argues that eLearning not only encourages 'life long learning' by alleviating physical constraints but also by removing some of the perceived barriers of higher education, enabling students to work towards their preferred course and goals at their own pace and ability.

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Whilst society's enthusiasm for life long learning seems to be increasing, the question of which institution will deliver the learning seems to be unanswered. Shapiro (2000) suggests that the social demands for higher education are not always being met. Furthermore, when they are being met, it is not through the traditional university educational system. Does this suggest that the social requirements for 'life long learning' could contribute the downfall of the traditional university? This opinion is supported by O'Hearn (2000), who outlines the requirement for alternative learning facilities, that are not bounded by traditional academic structure but can offer the equivalent qualifications. In South Korea the government revised the Lifelong Education Law 1999, and allows private educational institutions to grant degree level qualifications (Jung 2000). The very survival of the traditional university may depend on how higher education institutions address the concept of 'life long learning'.

Global Education Services

The Internet has allowed universities to expand beyond their local campuses and create global learning institutions for today's information age (Wilson 2001). This globalised network of education services has resulted in enhanced domains of knowledge being available to students (O'Hearn 2000). Certainly, according to O'Hearn (2000), global eLearning programmes provide 'real time' connections between students who can share knowledge resources, such as databases libraries, from anywhere in the world. This may indicate that students who are studying on a global distance learning degree may be more prepared for a global work market. This view is supported by Hemsley (2002), who studied Jones International University (JIU), which was the first university to be founded for the delivery of degrees on line. Hemsley (2002) stated that JIU have various degrees available all focused on the global expectation of today's work environment.

Nonetheless, Jung (2000) argues that successful deployment of educational technology on a global scale will be problematical for universities, due to the lack of an IT culture within educational institutions. Shapiro (2000) argues that universities will struggle to implement global eLearning courses, as worldwide implementation is unequal in terms of infrastructure and technical support. Students must utilise the IT tools efficiently to meet the academic demands of the course and this will increase the demands of both staff and students in eLearning environments, particularly when there are problems with the networks (Shapiro 2000). As a final point, the University of California Los Angeles (UCLA) propose that the introduction of Global eLearning courses would prove unsuccessful from both an educational and financial perspective. Wilson (2001) reported that UCLA students and prospective students were reluctant to enrol on courses anywhere in the world, instead, they would pay more to attend lectures on a university campus.

O'Hearn (2000) maintains that access to less traditional educational providers is growing, and indeed, higher education is no longer restricted by fixed locations or inflexible academic structures (Hemsley 2002). The concept of 'life long learning' is now a reality with the introduction of eLearning into higher education, which gives people in any country access to university courses (Evans 2002). Brown, Cromby and Staden (2001) describe how eLearning has assisted in the education and rehabilitation of students with disabilities. Shapiro (2000) argues that the creation of a globalised education network may cause significant problems for traditional universities, not only on a technical level but also with regards to course format and support. Whilst technology makes it possible to deliver higher education globally, is it likely that traditional universities will continue to exist in such a flexible global market? (Hemsley 2002).

Conclusion

ELearning could have potentially major effects on the way higher education is designed, implemented and delivered. Until now, universities have been static in their structure and delivery of higher education courses. However, demand for learning has never been so high, and this in conjunction with the need to geographically broaden learning may prompt universities to introduce eLearning initiatives. The same demands for learning and the increased revenue of independent educational providers, has produced a real threat to the very existence of the traditional university. ELearning may provide universities with a means of exceeding the newly formed competition, by taking full advantage of their traditional, already established reputations.

For students, eLearning can provide an educationally-superior alternative to traditional lectures, in which learning can take place outside the lecture hall. eLearning can also provide a model for students on how to become self directed independent learners, which may assist them to become 'life long learners'. For lecturers, networked learning may cause changes in work patterns and even change their professional role, but in addition, eLearning provides them with the opportunity to test students in real business situations and new methods to evaluate each student's learning. The role of the lecturer is predominant in the successful delivery of networked learning initiatives, as lecturers have the influence to eliminate students technical frustrations, make students feel empowered and encourage students to interact with one another. For lecturers, eLearning programmes represent a change in teaching style. The precise nature of the change is difficult to quantify, however allocation of sufficient time and resources, combined with managerial support, will help staff through the period of transition. Effective management can also help institutions to deal with any increase in lecturer workload by ensuring efficient use of resources

The last decade has seen a phenomenal growth in the use of the Web in university education, with various factors influencing the adoption of Web-based technology. The reduction of government funding in the higher education sector has forced universities to seek technological solutions to provide courses for a growing and increasingly diverse and distributed student population. Another impetus has been a shift in focus from teacher-centred to learner-centred education, encouraging educators to provide courses which enable students to manage their own learning (Sheard and Lynch 2003).

When considering the implementation of eLearning, educational institutions must be structurally flexible and be able to embrace the capabilities of distance learning as a tool to support overall learning. To utilise these capabilities successfully, higher education institutions must determine the most suitable environments and courses for eLearning delivery, indeed a successful eLearning course may be one that is blended with other more traditional face to face delivery methods. Pedagogical approaches have not radically changed over the last 25 years (Nabeth et al, 2004).

So the concept of developing an holistic learning organisation which empowers the learner and moves away from the didactic deliver model located within the traditional lecture hall is a relatively threatening anathema to a number of staff and institutions. Granting more autonomy to the learner and at the same time adapting to systems which are less stringently controlled or supervised will create potential internal conflicts (Wolters 2003). These may not all be at the academic interface. The integration of numerous internal procedures and processes as well as multiple IT systems will all mitigate against the successful implementation of a cohesive and supportive eLearning context or environment. ELearning has a fundamental impact on the structure of HE. Whilst the growth in demand can be accommodated by its implementation, the diversity of the new student population requires that institutions carefully develop programmes that will satisfy a broad range of learning requirements. This challenge is intensified by changes to the competitive environment where, in the wake of lifelong learning, traditional institutions are competing with corporate and virtual universities particularly for the mature student population. (O'Neill, Singh and O'Donoghue, 2004).

There is a need to acknowledge that active learning within a technologically based environment necessitates the establishment of a theoretical framework as part of the learning process, (Manning, Cohen & DeMichiell, 2003). This realization will mean that the use of technology is not about replacing learner process, but enhancement and extension of such. This is most important if we are not to simply 'cut and paste' content, which may have worked in the lecture theatre, in virtual and technology based learning environments.

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