2001

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Oliver, R. (2001). Assuring the Quality of Online Learning in Australian Higher Education. In M. Wallace, A. Ellis & D. Newton (Eds). *Proceedings of Moving Online II Conference* (pp 222-231). Lismore: Southern Cross University.

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Abstract

This paper discusses the major issues confronting the successful adoption and sustained use of online learning in higher education within the Australian context. The paper argues that four main issues which universities must deal with to achieve maximum potential from online learning technologies are: the establishment of cost-effective practices; the achievement and maintenance of quality in online learning delivery; ensuring access and equity in the delivery of programs; and establishing practices which can enable online learning to be sustained and to grow as a mainstream activity in university teaching and learning. While these issues are suggested as discrete entities, it is recognised that there is considerable overlap in the influencing factors and in the strategies and processes by which they can be overcome.

The paper describes and proves exemplars of a number of strategies for dealing with the issues in ways which provide the means to support and sustain quality online learning programs within universities and in the broader educational context. These include: the development of proactive programs to improve teacher expertise in the design, development and delivery of online teaching; the use of programs to support and maintain student readiness; the need to provide adequate technology infrastructure to support the programs; and the use of strategies supporting the design and development of online programs based on the customisation and reuse of learning objects.

Introduction

Universities like many other institutions are currently grappling with the dilemma of the use of technology in teaching and learning and developing strategic plans and processes that will take them forward in sustainable ways. General consensus is that technology will play a large role in the planning, development and delivery of the curriculum of the contemporary university and the challenge for institutions is to make decisions now that will set them on the preferred and appropriate path for the future.

The place of on-line learning in education is clearly aligned to the issue of quality. Providing the best possible forms of on-line learning is a critical component of the quality assurance process. Biggs (2001) describes the concept of quality in higher education as comprised of 3 main elements: quality as value for money, quality as fit for the purpose of the institution, quality as transforming. Biggs argues that while the first of these is a retrospective measure, the remaining are pivotal parts of any quality assurance process aimed at maintaining and enhancing the quality of teaching and learning in the institution.

Plotting pathways into the future that can ensure online learning provides fit for purpose and is transformative in its approach is fraught with difficulty. The difficulty of predicting how technologies will emerge and how people will respond to them creates uncertainty at all levels. The good news is that while some of the steps that need to be taken early are very important, the field is very flexible and formative and there is scope to experiment and to trial new ideas ahead of any firm decisions and commitments.

The purpose of this paper is to consider the current status of online learning technologies in the university sector and to suggest the issues that need to be addressed to maximise the opportunities and minimise the risks associated with their uptake and implementation. The paper is written to inform teachers more than administrators because the best opportunities with online learning come from successful bottom-up approaches undertaken and owned by the most important stakeholders, teachers and their students.

What are the important issues?

The important issues in moves to online learning are similar in many respects to the majority of other issues that impact on any initiative or new strategic direction in universities. Using Biggs (2001) discussion of quality, and considering the distinction between retrospective and proactive ways and means for assessment and assurance, the types of issues which surface stem mainly from the economic and political strategies and forces which promote the moves to reform and change university teaching and learning: the need for accessibility, flexibility in programs, economic imperatives and movements supporting improved learning quality (eg Holt & Thompson, 1998; Fraser & Deane, 1997; Nunan, 1996). These issues manifest themselves in practical terms in university settings through such strategies:

- **Achieving cost-effective solutions for online teaching and learning.** Many writers are still unconvinced that the promised economic returns for this alternative form of delivery are being met . There are a number of strategies being proffered now which have the prospect to make online learning more cost-effective (eg. Jung & Rha, 2000);
- **Achieving and maintaining quality in online learning.** There has been the view in the past that online programs and courses by their very nature are more effective and flexible for learners. Research is now suggesting that this is not always the case and that there is a need for institutions to proactively pursue such issues of quality (eg. Biggs, 2001);
- **Ensuring access and equity in the delivery of online programs.** Flexible and open learning programs were always proffered as ways to reduces issues of equity and access however in online forms, the technology components are realising large access issues and this is causing many to seriously question the whole process (eg. Roblyer, 2000).
- **Sustaining online program delivery.** Many technology-based learning programs have flourished in the past with injections of income and support from special projects

but the programs themselves have tended to remain as specialist activities and few tend to end up as mainstream activities (eg. Collis & Oliver, 1999; Alexander & McKenzie, 1998);

There are other singularly important issues that confront individual institutions with individual needs, however the issues described above provide a sound framework with which to consider strategies and solutions that can be used to overcome them. It is interesting to note that the strategies and processes considered in the following sections provide scaffolds and supports across all the issues. It is difficult to target particular issues with discrete strategies because the issues are intertwined and intermeshed in such strong ways. The following discussion is intended to provide an understanding and a list of possible approaches to overcome the various impediments and hindrances that exist to limit the potential of online learning in higher education.

Sustaining online learning

An underpinning current influencing the successful adoption of online learning technologies in higher education is the establishment and maintenance of processes that create settings which are sustainable and provide a means for ongoing and self-supporting activity. If online learning is to return the benefits and opportunities it promises, it must become part of mainstream practice in the university setting. For online learning to become part of mainstream practice, it needs to sit comfortably with teachers and students and it needs to be easily achieved and maintained. The following sections describe strategies and factors that present themselves as issues and potential solutions.

1. Teacher Expertise

Teaching online is a vastly different process to conventional teaching. It usually involves changes to both pedagogy and teaching practice. For online teaching to become mainstream, it is necessary for institutions to ensure that their teachers have appropriate skills and expertise in not only the delivery of online courses and programs but also their design and development. A substantial proportion of the literature describing online learning provides evidence of a lack of teacher readiness for large scale moves to online learning. For example:

- **Teaching online.** The literature frequently describes online learning settings that replicate conventional teaching practices and which fail to capitalise on the new learning opportunities (eg. Mioduser, et. al. 1999, Dehoney & Reeves, 1999).
- **Using technology in teaching.** In a recent DETYA survey conducted among Australian university students, students indicated that about 80% of their university teachers used technology in regular ways as part of the teaching and learning program (Oliver & Towers, 2000).
- **Technology currency.** Academics in universities in the USA were found to be quite competent users of technology in their teaching but that their competence and preference was more to older technologies, for example, word processing, than newer technologies, for example, online course delivery (Groves & Zemel, 2000);
- **Teacher training.** Online teaching requires a vastly changed skillset to that of conventional face-to-face teaching. Goodyear, et. al. (2001) argue a need for professional development for to focus on the various new roles of the online teacher including researcher, assessor, advisor, technologist, designer and manager.

Many barriers exist to limit the adoption of ICT within teaching. Jenkins (2000) argues that the barriers include: psychological barriers, teachers' alternative underlying pedagogical beliefs often preclude ICT, difficulties changing teachers' deep rooted mental structures on the *art of teaching*; the difficulty for teachers of keeping up with the pace of ICT developments; and an underestimation of the time and energy taken to bring about sustainable change.

Teacher readiness is in most instances a matter of staff development and opportunity. Most universities within Australia recognise the limiting features of staff readiness for online learning and now have organizational structures and strategies that are aimed at supporting this endeavour.

2. Student Readiness

The move to online learning must also take into account the readiness of learners. In today's age of corporate governance and customer-centred approaches, it can be arrogant and unwise for universities to impose online learning on students without first addressing their needs and concerns. A number of studies in recent years have highlighted critical aspects of learner readiness that need to be addressed. Some of these more important issues include:

- **Technology skills.** There are still many students in the university setting who lack the basic skills and experience needed to be able to support themselves from a technology perspective in online settings. A recent survey conducted for DETYA revealed that only about 60% of university students reported the levels of skills and expertise in technology use required for self-sufficiency in online learning (Oliver & Towers, 2000).
- **Access to Technology.** Many students still do not have access to the forms of technology required for online learning. Access issues appear strongest among students from minorities and groups with special needs. For example, students in rural regions, indigenous learners, students with disabilities, mature age learners (Oliver & Towers, 2000). For these students, moves to online learning often pose more impediments than opportunities.
- **Technology literacy.** Success in an e-learning world demands new forms of literacy and expertise of students. Rossiter & Watters (2000) describe a study among Australian university students of the emerging forms of technology literacy deemed important for learners in technology-based settings. They argue the need for universities to consider the development of a broad range of learner skills with social and cultural as well as technical dimensions as part of their contemporary programs and curricula.
- **Self-regulated learning.** Online learning brings with it increased modes of student-centred learning. Student-centred learning is a more difficult learning process for many. It aims to promote understanding and deep learning as compared to the alternative shallow or surface learning (eg. Biggs & Telfer, 1987). Students need scaffolded and supported as they develop their capacities for self-regulated learning. Studies frequently cite students' initial preferences for conventional learning over contemporary learning settings (eg. Oliver, 2001).

The literature suggests that university students are developing the skills set required for self-sufficiency in online learning but most writers agree that there is a need for universities to address this issue in some formal way in the planning and delivery of their academic programs (eg. Rossiter & Watters, 2000).

3. Technology Infrastructure

There is a large technology infrastructure overhead for universities pursuing online teaching and learning as mainstream activities. The move to online learning creates the necessity for effective and efficient systems for the storage, delivery and access of online courses. Universities have dealt with these needs in different ways:

- **Courseware delivery systems.** Most Australian universities support a standard form of courseware delivery system through which courses and programs are delivered. Such systems, WebCT and Blackboard, for example, provide a stable and consistent platform for the institutions and a basis on which staff development, materials development and course delivery can be based.
- **Technology infrastructure.** Providing access to online courses creates significant demands on the technology infrastructure of universities. No longer can universities provide technology access to only those students in technology-related areas but access to technology is expected by all. Solutions which universities have sought to meet this need have included large scale open access computer laboratories, optional computer leasing schemes and mandatory computer ownership schemes. In schools, Australia is recognised as a world leader in programs associated with laptop provision for students (eg. Poftak, 2001).
- **Service Provision.** Online learning requires students to have access through networks to the university servers. In conventional settings, universities have tended to have provided students with free access to resources that were seen to be critical to learning. In early e-learning settings, free access to online materials was often evident (eg. Ring, 1997). As the costs have risen, however, universities have begun looking for ways to place the onus of cost of access back onto students. Today students are often required to have their own Internet Service Provider and to meet all the costs associated with connection and materials access.

The provision of adequate technology infrastructure for online learning is an expense that all institutions need to face, be they school, VET or higher education. There are examples of differing strategies in place throughout the world which can act to inform and guide organizations. The clear signal which comes from much of the literature suggests the need for infrastructure to be tied to the professional development of staff so that decisions are led by pedagogical and educational considerations rather than the technology itself (eg. Jonassen & Reeves, 1996).

4. Reusable Learning Objects

Critical to the success of online delivery strategies within higher education institutions is the prevalence of materials and resources to support the learning settings. Contemporary delivery systems provide a number of tools for the teacher to use to enable communication and interaction with learners but institutions themselves need to find the content and the resources that will populate their learning settings.

For most universities this process is quite expensive and time consuming. The development and production of materials is often done at the individual unit level by the individual lecturer. More recently, institutions have become cleverer and have taken to more strategic ways to create learning resources. With the proliferation of on-line learning courses and

Early designers of Web-based materials focused heavily on developing on-line content and the majority of Web courses were based on delivery of these resources. Current design processes are now looking to maximise the reuse of learning materials and this has led to a number of reconsiderations in terms of the design and development of on-line learning settings.

Reusable learning objects are now being seen as the fundamental components and building blocks of on-line learning courses. A learning object is any entity, be it digital or non-digital, that may be used for education and training (IEEE, 2001). In the context of on-line learning, these objects take such forms as Web pages, pdf documents, database applications, animations, Java applets, Powerpoint presentations and Quicktime movies.

Processes and activities that are currently being used in different settings to create more cost-effective solutions for online delivery of educational programs through the customisation and reuse of learning objects include:

- The development of national frameworks to support and develop on-line learning resources (eg. Anderson & Downes, 2000; ANTA Flexible Toolboxes, 2001; Education Network of Australia);
- The development of libraries and databases of online learning resources for sharing and reuse, for example, Ariadne: http://ariadne.unil.ch/, MERLOT: http://taste.merlot.org/, LRX: http://www.lrx.com.au/, and SoURCE: http://www.source.ac.uk/);
- Consortia among institutions to create larger markets, for example, Universitas 21: http://www.universitas.edu.au;
- The development of specialist organisations that broker instructional materials, technical delivery support and learner support services for institutions (eg. Farrell, 2000).

Learning objects serve many functions associated with providing quality measures for online learning. As well as providing cost-effective measures for development, they support quality instructional design. Learning environments based on the principles of effective contemporary teaching are well supported by online learning settings constructed with learning objects (eg. Downes, 2000). Some learning objects can be used as the framework for learning designs while others can be used as the resources to support learning.

5. Reusable Learning Design

Contemporary online learning development in higher education is moving away from the notion of learning settings being comprised of pages of electronic text, to more deliberately planned learning designs. In previous settings, instructional design had focused on developing pathways for learners through learning content, whereas in contemporary settings the designs are now focusing on providing learning activities that bring about planned learning outcomes.

In previous settings, learning content was chosen in the initial design process and the instructional design concerned itself with creating tasks and challenges that helped learners to understand the content being presented and to consolidate their knowledge acquisition. In online settings, these types of activities tend to represent situations where students learn from the information presented by, and through, the technology.

In contemporary settings, instructional design places far less emphasis on content and information as knowledge to be learned. It looks to the provision of learning designs that guide learners through roles and responsibilities that reflect real and relevant applications and contexts. A principal aim of the instructional design is to create student-centred settings that support students' development of self-learning and metacognition and collaboration with others. The content becomes a means to an end rather than an end in itself and learning is mediated by the technology applications.

As mentioned previously most Australian universities tend to provide courseware delivery systems as the basis for the delivery of online programs. These systems provide supports for the teachers but do not actually provide any firm learning designs as the basis of their delivery. As a consequence there is a high degree of sameness that emanates from online courses delivered by such systems.

A number of recent projects have demonstrated the value and potential of generic learning design tools as supports for online learning. These tools, are learning objects by definition, and provide generic shells for teachers to customise and use in their own settings (eg. Oliver & McLoughlin, 2001; Bonk & Dennen, 2001). A number of international and national projects are now seeking to explore the development of such learning designs for large scale and mainstream university use.

The Australian University Teaching Committee (AUTC) has recently instigated a large scale project titled Information and Communication Technologies (ICTs) and Their Role in Flexible Learning. This 2 year project that commenced in November 2000 seeks to provide opportunities for university teachers to create high quality flexible learning experiences for students. This is to be accomplished by the development in the project of a range of software tools and templates based on previously successful ICT-based learning projects in a form which will enable teachers in other settings and subject areas to create similar learning environments for their students. The project is looking to develop a range of high quality learning designs that can be customised and implemented by academics seeking to employ contemporary learning designs in their online teaching (Oliver, Harper & Agostinho, in press).

Summary and Conclusions

This paper has discussed the major issues confronting the successful adoption and sustained use of online learning in universities. The paper has argued that there are four main issues which often impede universities from achieving maximum potential from the new online learning technologies. These involve developing cost-effectiveness approaches; achieving and maintaining quality in online learning; ensuring access and equity in the delivery of online programs; and developing strategies to sustain online program delivery. While these issues are suggested as discrete entities, it is recognised that there is considerable overlap in the influencing factors and in the potential solutions by which they can be overcome.

The paper argues that potential strategies for dealing with the issues in ways which will provide the means to support and sustain quality online learning programs within universities include: developing proactive programs to improve teacher expertise in the design, development and delivery of online teaching; providing programs to support and maintain student readiness, the provision of adequate technology infrastructure to support the programs

both for students and staff; and strategies supporting the design and development of online programs based on the customisation and reuse of learning objects supported where possible through the use of high quality reusable learning designs.

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