ACHIEVING QUALITY IN TECHNOLOGY-SUPPORTED LEARNING: THE CHALLENGES FOR ELEARNING AND DISTANCE EDUCATION.

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Abstract
An important focus in all higher education institutions employing technology-supported learning in elearning and distance education is ensuring that learning is effective and processes are efficient. There are many factors in the use of learning technologies that can limit and impede the quality of program delivery and learning outcomes. This paper will explore approaches to quality assure technology-supported learning in elearning and distance education so that the outcomes are sustainable and effective. The paper will draw on experiences and outcomes in the Australian higher education sector to demonstrate principles and practices that can be applied by institutions seeking to ensure quality outcomes from using learning technologies in elearning and distance education.

Introduction

The growing use of elearning as an integral component of university learning brings about some pressing challenges for universities as they seek to ensure the quality of their academic offerings. In all forms of technology use, there can be compromises to quality brought about by a myriad of factors. For institutions involved in the large-scale delivery of distance educational programs, elearning is now an integral component of the delivery process. The use of technology introduces many more variables into the learning and teaching processes and this can lead to marked differences in the quality of offerings within and between institutions (Tynjala, Valimaa & Sarja, 2003).

More and more these days, institutions are being held accountable for the quality of their course offerings and their delivery. The corporatisation of higher education has seen a move from institutions being able to concern themselves alone in the consideration of quality to situations where government and agencies have become directly involved (Harman & Meek, 2000). Today there are many more people judging the performance apart from institutions themselves. Quality assurance has become an integral component of the core business of universities worldwide as they seek to maintain and improve their offerings, productivity and in may cases, profitability.

Quality assuring educational outcomes and achievements is a process with many facets and components. In many settings the process seeks to ensure compliance and accountability. In others it seeks to deliver self-improvement, innovation and excellence (eg. Hodson & Thomas, 2003). Quality assurance processes for universities involve a myriad of variables associated with the programs and must also involved the many stakeholders extending from students to the communities with whom universities engage. As well, technology-based and distance education settings can add many variables to determinations of quality (Lawless & Richardson, 2002).

Given the plethora of factors that can conceivably influence the quality of technology-based learning, the use of a risk-based approach to quality provides a means for institutions to strategically address those factors which matter the most. A risk-based approach is where stakeholders engage in risk management by strategically managing risks and optimising opportunities to achieve stated objectives (Towers, Alderman, Nielsen & McLean, 2010). It involves the identification of those factors which pose the highest potential risk to outcomes and success and ensuring that these aspects are those where the most attention is paid.

Understanding quality elearning and distance education

Quality in elearning and distance education requires attention to the way application of the technology is planned, the way it is implemented and the means by which achievements and attainments are monitored and improved. For this to happen, institutions need to ensure that they have processes in place that can successfully oversee all facets of the program that extend from the processes associated with student selection and enrolment, through teacher training, to the quality of design and development of the learning settings, to measures of the successful delivery of courses and the administrative processes used to manage and coordinate students and programs.

A typical model that can been employed to frame the quality assurance processes for e-learning and distance education uses the framework of inputs, processes and outputs as a means to determine the important and influencing elements of quality (Fig 1). Within these attributes, the model considers separately those elements associated with the teaching (teachers) and the learning (learners). The usefulness of this model is that it ensures the focus on quality relates to more than the activities associated with the delivery but also on issues associated with such peripheral elements as the quality of the students and the learning outcomes achieved (Oliver, Herrington, Stoney & Millar, 2005).

	teaching	**learning**
inputs elements and attributes which describe pre-conditions for successful teaching and learning	For example: • course establishment and course review processes • curriculum specifications • course materials & resources • teacher qualifications and currency • strategic plan for teaching and learning • facilities and resources for teaching and learning	For example: • criteria for entrance into courses • student demographics • students' skills and experiences • students' progression through courses
processes elements and attributes which describe on-going conditions for successful teaching and learning	For example: • provision of appropriate learning experiences • work, community and professional engagement • assessment procedures • student support	
outputs elements and attributes which describe post-conditions from successful teaching and learning	For example: • continuous improvement in teaching processes • reflective practice and ongoing commitment to continuous improvement in teaching processes	For example: • graduates are employable in various ways • graduates can demonstrate outcomes • course satisfaction and attitudes

Figure 1: A framework describing quality teaching and learning (Oliver, Herrington, Stoney & Millar, 2005)

Understanding the important elements is but the first step in the determination of a process to ensure quality. Quality assurance is achieved through the application of a process that commences with an understanding of what form of quality product is sought, a measurement of what is being achieved and some proactive measure being employed to redress any issues or shortcomings (eg. Bornmann, Mittag & Dabie, 2006). This process needs to be a continuous process that provides the means to use the data gathered to guide the implementation of improvements and the reapplication of the process to continue in a cyclical form.

Organisations and institutions that seek to promote quality in a sustained and strategic fashion apply a formal process across their business activities to achieve this. These processes usually take the form of a cycle which describes quality as a process that is considered as the organisations, plans its

activities and outcomes, undertakes the means to achieve these, reviews outcomes and achievements and implements improvements to address underperformance and non-achievement of planned outcomes. Such cycles are usually referred to by acronyms that represent the various sage, for example plan, do review and improve is the PDRI cycle. In organisations where quality is important, such cycles are integral to the activities and embedded into the organisation as integral and important with considerable resources given to support their implementation.

Assessing and reviewing for quality

The stages in the quality cycle that are often least well applied are those of review and improve. These stages are those where the outcomes are assessed against goals and measures taken to address issues. Many institutions with mature quality approaches use benchmarking processes or comparisons with standards to review outcomes. Benchmarking compares the performance and outcomes in one setting against those achieved by others in a similar sphere. The outcomes from a benchmarking activity seek to provide a measure of the comparability of outcomes. The use of standards uses criterion-related references to judge performance. With standards-based approaches, the outcomes and performance are assessed against measures to provide some objective indication. Benchmarking processes tend to provide a means to compare achievements relative to others while the use of standards provide the means to assess outcomes and performance against desired goals.

Benchmarking is a process commonly used in industry in which businesses use known leaders as models and targets. The process involves comparing local practices against known best practice to determine where there is a need to improve. In industry, benchmarking systematically studies recognised excellence, then uses the examples of best practice that are identified as the standard of comparison (eg. Achtemeier & Simpson, 2005) but benchmarking can be a difficult process to apply in most university settings (McKinnon, Walker & Davis, 2000). The difficulties tend to lie in the diversity of the products being compared and the often individual nature of university courses.

A number of groups have sought to develop metrics and processes to assist organisations to quality assure elearning and distance education. For example, BENVIC (Benchmarking of Virtual Campuses) was undertaken within the European Union around 1999 and identified eight core meta-indicators against which activities and performance might be measured. These activities included: learner services; learning delivery; learning development; teaching capability; evaluation; accessibility; technical capability; and institutional capability. The BENVIC project provided for each of these indicators a range of assessment measurements to facilitate the means to quantify performance in ways that would enable outcomes to be established against standards or the performances of others. The assessments involved measurements of structure, practice and performance.

ACODE, the Australasian Council on Open, Distance and e-learning, developed a set of benchmarking categories to enable institutions to assess performance and outcomes in elearning and distance education. The ACODE parameters are quite similar to the BENVIC meta-indicators and break down into quite specific elements able to influence the many associated outcomes from these forms of learning. The ACODE parameters are described as:

- Institution policy and governance for technology supported learning and teaching
- Planning for, and quality improvement of the integration of technologies for learning and teaching
- Information technology infrastructure to support learning and teaching
- Pedagogical application of information and communication technology
- Professional/staff development for the effective use of technologies for learning and teaching
- Staff support for the use of technologies for learning and teaching
- Student training for the effective use of technologies for learning

- Student support for the use of technologies for learning

The application of these parameters as part of a quality assurance process involves the use of rubrics and scales to quantify outcomes and performance. The large number of scales and scale measurements provides the means to gain a broad overview but in many respects gives little assistance for improvement. The utility of such systems to support the quality assurance of activities is enhanced when the rubrics and scales are used in the planning and implementation phases of the quality cycle as well as the review and improve. Their use in the planning stages provides the means for them to be part of an approach that encourages and facilitates excellence more than simply a means for seeking compliance with policies.

Opportunities and advantages of technology-supported learning

The emergence of elearning as a principal form of distance education program delivery derives from the potential opportunities and benefits afforded by its informed use. In considering strategies to ensure quality in technology-based learning settings, it is important to consider the opportunities and advantages that the technologies are able to provide to ensure these are included in the goals. The opportunities and advantages are often cited as providing for more learning, better learning; better learners; and better teaching.

The opportunity for more learning derives from the ways in which technology can be used to provide increased access to programs for many students. For those students with access to education, technology provides opportunities for more flexible options in when and where they choose to study and for many students, technology provides the means for stronger support for their independent learning than might otherwise be available. In terms of better learning, appropriate use of technology can enable the scope and extent of learning to be enhanced. Technology provides opportunities for a range of different forms of learner engagement to be applied. Students can use technology to network with others, to access real world resources and information and to discover alternatives for themselves. Whereas previously students were often led by their teachers in terms of the resources and content to which they had access, and were limited in their interactions with others in the immediate setting, technology can open and expand all these elements of learning.

The consequence of learning in settings where learners are able to take greater control and responsibility for their learning activities has been shown to be the development of students' own learning capabilities. Technology can enable students to become more independent learners and to exercise options and choices in terms of how they learn. The outcomes from technology-supported learning settings frequently show students to be demonstrating strong learning behaviours and regulating their own learning rather than relying on the teaching to alone for this. And another clear opportunity and advantage that many institutions derive from the use of technology is the capacity for the learning to be better managed and the learning to be more strongly facilitated. There are now many technology systems in place in institutions that are used to assist teachers to oversee and guide their students. Such systems are often shown to be able to identify students at-risk in time for assistance to be provided, to be able to create administrative efficiencies for teachers to better manage large groups, to better cater for diversity within groups.

Identifying risks to achieving successful learning outcomes

In quality assuring elearning and distance education, is important to be able to understand those attributes that are critical to a quality product and the relative impact of those factors on quality. In relation to technology-supported settings, there has been much written about the impediments (risks) to the successful application of learning technologies (eg. Cuban, 2003) and the risks tend to lie in

three main areas: issues arising from the design (or lack of design) of the learning programs, the resources and materials that are provided for the learning settings, and the manner in which programs are delivered and provide support to the learners. These areas describe quite broad activities and within each there are many elements that can impact on the overall achievement of quality learning outcomes.

Assuring quality in learning designs

Research continues to show that a consistent problem limiting quality learning outcomes for elearning and distance education stems from the use of learning designs that fail to best use the affordances of the technologies to enhance learning (eg. Lockyer, Bennett, Agostinho & Harper, 2008). The term *learning design* describes the deliberate learning activities and processes that a teacher or instructional designer plans into a learning environment to provide the cognitive engagement a learner needs to bring about the required conceptual change associated with the planned learning outcomes. Learning designs can be applied at the level of a whole subject, subject component or learning resource. Typically most teachers will consider learning design at a lesson level in quite limited ways. Boud and Prosser (2002) argue that high quality learning activities must create opportunities for learner engagement whilst providing acknowledgement of context and providing a challenge for learners that incorporate opportunities for practice. Whilst it is a relatively simple process to describe the learner behaviours learning designs need to support, it has proven to be a far more difficult task to describe the actions and sequences in learning events that can deliver these in learning settings.

Elearning settings across all sectors of education have long been criticised for their limited and shallow learning designs (Cuban, 2003). Typical online courses are usually comprised of comprehensive electronic resource sets and information with little intentional instructional design aimed at supporting meaningful learning. The most common forms of learning design involve students reading screen-based texts and answering questions with limited engagement. Whilst the literature abounds with examples of more effective learning designs, for example, problem-based learning and authentic learning, there has been no mainstream uptake of these approaches in any serious fashion.

There is currently a plethora of research being reported across all sectors in which the concepts of learning designs and their successful implementation are being investigated and addressed (eg. Lockyer, Bennett, Agostinho & Harper, 2008). A number of studies have sought to explore strategies for describing learning designs in ways that facilitate their sharing and reuse. This has been a particularly difficult endeavour given the nebulous nature of the activity that is trying to be described. A number of projects have investigated the establishment of repositories to enable successful learning designs to be shared and accessed (eg. Hedberg, Wills, Oliver, Harper & Agostinho, 2002). Such projects have developed quite comprehensive collections of learning designs but have not really achieved their goals of generating and supporting widespread sharing and reuse. One possible exception to this observation would be the Learning Activity Management System (LAMS) project. The LAMS project has developed an open-source intuitive Web-based system that enables teachers to create and implement online learning sequences that can be integrated into existing learning management systems (Dallziel, 2007). The LAMS project has established a community of users who share their learning sequences and collaborate to enhance and improve their application and use.

Given the importance of the student learning experience in the determination of learning outcomes, this must be seen as a critical area in any quality assurance process. In considering strategies for ensuring there is consistent use of effective learning designs, institutions need to look to their institutional practices, their staff training approaches and the supports provided in the design and development of technology-based learning settings.

Assuring quality in learning resources

All elearning settings necessarily include learning resources. These provide the content and course materials that underpin the conceptual change in the planned learning outcomes. In most elearning settings, there are substantial amounts of course material provided for learners and the factors of the materials that influence quality are the same as those that influence the quality of conventional resource sets. For example: how well the resources support the planned learning; the scope of the resources; the currency of the resources; the appropriateness of media usage; and the relevance of the resources (eg. Littlejohn, 2003).

There are however, a number of extra factors that are involved with the provision of resources in elearning and distance education. The duplication and proliferation of online resources has led to a greater awareness of the notion of reusability as both a design and development strategy for online learning materials (eg. Downes, 2000). The manner in which elearning resources are planned and sourced can play a large role in the success of the learning experience and the ongoing sustainability of the course delivery. The reusability of learning resources offers many advantages to all stakeholders in the learning process and is now considered an important factor in any e-learning process. There are many benefits to be gained from such stakeholders as:

- The administrative and financial agents who can benefit from the potential costs savings associated with reusing and sharing learning resources;
- The policy-makers who are necessarily interested in the legal and ethical implications of copyright and intellectual property among digital resources;
- The instructional designers who can gain considerably from design strategies that facilitate and support sharing and reuse; and
- The resource developers who can gain considerable efficiencies and economies of scale from development strategies that ensure interoperability and a capability for use of resources beyond the context for which they are designed (Downes, 2000).

Whilst the high levels of attention being paid to the concept of learning objects several years back has waned to some degree, the importance of this concept in the quality and sustainability of technology-based learning still remains. The work undertaken by a number of large organisations and groups to facilitate the reusability and interoperability of digital learning resources, for example, IMS Global Learning Consortium, ADL, IEEE, has gone a long way to providing the means of organisations to effectively source and develop resources for contemporary learning programs. There is currently a large movement among universities to contribute to the growing use of open educational resources, (OER). OER has taken the early work with learning objects and extended the activity to the sharing and reuse of resources with minimal copyright restrictions through forms of organised global sharing. (OER Commons, 2010). The main impediment to the overall success of this activity in becoming a mainstream and sustainable activity among all institutions is the development of a seamless means for the resources to be stored and accessed from repositories and for institutions to be willing to share resources into the repositories. Previous research into the development and application of repositories and databases of digital resources to foster the reuse of learning resources revealed problems with the administration and organisation of the repositories themselves more than the effective use of the resources for learning. (Brownfield & Oliver, 2003).

Assuring quality in learning supports

Another area of risk to quality frequently found in elearning and distance education lies in the provision of learning supports. Learning technologies provide the means to support learning in many diverse ways. There are many strategies that can be employed but research frequently indicates that students are dissatisfied for many reasons with the levels and forms of support they receive (eg. Salmon, 2004). The provision of support mechanisms for students in elearning settings contributes to the learning experience in a number of ways:

- It enables learners to establish a sense of belonging and involvement, a sense of community, which encourages and motivates participation;
- Supports can scaffold learning and help students to undertake and complete activities and tasks they might not be able to do on their own;
- Learning supports in the form of communications and discussions provide opportunities for higher order thinking and conceptual development often not evident in independent learning settings. (eg. Brook & Oliver 2003);

Successful learning supports enable learners to interact seamlessly with the various systems, peers, mentors and teachers in the learning process. However many elearning and distance education settings are often designed to facilitate independent learning with little opportunities for interaction with others. Research has shown that learning settings that provide such forms of learner support as mentoring, modelling, coaching and scaffolding (eg. Dennen, 2002) provide strong opportunities for enhanced learning. The focus of considerable research in recent years (eg. Salmon, 2004) has sought to explore strategies for providing these forms of support in e-learning and distanced education settings.

Contemporary technologies provide many opportunities for supporting learners in ways that are engaging and effective. All virtual learning environments and courseware management systems provide such facilities as discussion boards, chat-rooms and groupware as a matter of course Emerging applications involve virtual worlds and settings where learners can participate actively in scenarios and role-plays. The wide range of social media tools provide teachers with many options for creating networks and communities for learners as both contexts for learning and learning supports. There are a growing number of models of strong practice for the use of the emerging technologies and teachers frequently share their experiences with new and innovative approaches through conferences and online communities.

Teachers using new technologies require training and experience to be able to apply these tools effectively in learning settings. Many of the strategies that are used to support learning in face-to-face classrooms need to be changed when the students are studying at a distance. Institutions need to recognise the need for training and support for teachers if they are to be able to make effective and efficient use of new technologies in learning and distance education. In the quality assurance cycle, a large part of the improve phase involves the provision of appropriate training for teachers and the provision of appropriate tools and supports for them. .

The main quality issue with learning supports revolves not around whether these tools are available but the strategies and means teachers employ to make effective use of them in the learning setting. Best practice in e-learning involves high levels of deliberate and planned learner support.

Summary and Conclusion

There are many challenges that face institutions seeking to achieve quality in elearning and distance education. Some of the challenges are the same as those which face all institutions in relation to the offering and delivery of educational programs. These include such factors as ensuring there is a quality curriculum, there is appropriate infrastructure and resourcing, ensuring the programs are well administered and that there are processes in place to ensure quality assurance. In the context of technology-supported learning there are particular challenges to be faced that draw from the unique aspects of technology as a medium for teaching and learning.

Ensuring the quality of elearning and distance education can be effectively facilitated by using a risk-based approach to quality assurance where the focus of attention is given to those factors that are

known to have toe greatest potential to impede outcomes and are likely to have the greatest influence on student learning. Research and activity in technology-supported learning across the years has revealed that three areas of particular risk are those associated with the planning, development and provision of learning designs, learning resources and learning supports in the courses and programs themselves.

This paper has explored the various means by which institutions can recognise and employ processes and procedures that can enhance the opportunities for quality learning in elearning and distance education where technology-based learning is being employed. A number of quality issues have been discussed in relation to best-practice in e-learning and distance education and these issues have been tied to a discussion of quality assurance processes involving benchmarking and standards of best practices. The paper has described the strategic use of a quality cycle as a means of undertaking quality assurance and the potential of benchmarking and standards as means to enhance the achievement of outcomes. The paper has highlighted a number of critical areas as posing the greatest risks for quality in elearning and distance education, these being the provision of effective learning designs, learning resources and learning supports.

As more and more universities seek to use elearning as a mode of delivery for their on-campus and off-campus units and courses, and as more and more they are being held accountable for the quality of the services they provide, the need grows for accepted standards and benchmarks against which performance can be judged. The paper has highlighted difficulties associated with quality assuring elearning given the depth and breadth of the activity but has demonstrated that there are guiding principles that can be used and there are examples of institutions seeking to explore benchmarking and standards as quality assurance processes for e-learning activities.

As institutions across all sectors of education proceed to mainstream elearning as an alternative form of program delivery, the need for objective measures of quality will grow. Elearning is an activity that has many costs and makes many demands on institutions, students and teachers. It is important to be able to satisfy stakeholders that the activity is providing the maximum possible return on the investment and that the demands are warranted. To do this, there is a need to discover and document best practice models that institutions can use to grow their capabilities and performances and also as benchmarks against quality can be demonstrated.

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