Using blended learning approaches to enhance teaching and learning outcomes in higher education

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Introduction

Despite all the strong advances and investments in the use of technology to support learning in higher education, there remans a degree of scepticism and concern among some that the use of ICT in education remains an unproven experiment (eg. Oppenheimer, 2003; Cuban, 2003). The principal concern expressed by such critics of ICT in education is the lack of empirical evidence for learning enhancement and the apparent low return on investment for ICT (eg. Oppenheimer, 2003, Romizowski, 2005). Large scale moves to use technology to support teaching and learning have often been shown to be premised on poor assumptions and inaccurate perceptions of public response.

Many projects like the UK eUniversity, NYU Online, Scottish Knowledge, Universitas 21 and Global University Alliance, all developed around e-learning applications, have failed to realise their aims and goals leading many to question the quality and capabilities of this form of educational delivery (Garrett, 2004). Like all forms of education, there are both good examples and bad examples in practical settings. The questions many people are looking to answer is, what are the necessary and optimal conditions for successful e-learning in higher education and can these conditions guarantee that e-learning will be successful? Many of these questions have become more important in the current era where accountability is a key concern in the higher education sector.

Blended Learning

For some years now, stakeholders in the education process have been seeking ways to create efficiencies and economies in the delivery of educational programs through technology-facilitated means. The appeal of low overheads and learning managed by large scale appli8cations of technology has been a principal driving force behind much of the activity in e-learning. But more and more, the research is showing that effective learning occurs when students learn with computers rather than from computers (eg. Collis & Moonen, 2001). The notion of students learning with computers describes the process where the learners' use of technology has strong teacher support whereas the notion of learning from computers suggests a setting where there is minimal evidence of teacher involvement in the actual learning processes.

The term blended learning to describe forms of ICT support for learning has recently come into vogue (eg. Bonk & Graham, 2005). Blended learning describes technology facilitated learning that retains a strong and deliberate role for the teacher in the learning process. Blended learning appears to provide strong supports for instructors looking to create learning settings based on strong learner-centred modes of delivery (Oliver, Herrington & Reeves, 2005). Such approaches provide instructors with a raft of affordances and opportunities for creating engaging and supportive settings. It is the capability of blended learning to draw the maximum benefit from the technology affordances while retaining the best features of face-to-face teaching which makes it so ideal for supporting engaging learning activities.

The key element underpinning a blended learning environment is the scope and nature of the communication channels provided to support learners. The blend often depends on the level of face-to-face communication that can be provided for students. In most settings, there can be unlimited scope for technology-mediated communication but far more restrictive amounts of face-to-face communication. Writers often use a continuum to illustrate blended learning with the alternative forms of communications as the extremes and the blend comprising a planned mix (see Figure 1). Interestingly, there is still a degree of uncertainty in the discussion concerning the precise nature of the communication that is being discussed. There are, for example, ways to simulate face-to-face communications through videoconferencing and other interactive forms of technology. In such settings, the forms of interaction can be very close to what occurs when participants are in the same room despite their real distance.

face to face communications	**technology-mediated communications**
eg. classroom settings, workplace learning, mentoring	e.g., online bulletin boards, asynchronous communications, email

Figure 1. A continuum describing blended learning (Oliver, Herrington & Reeves, 2005).

The notion of blended learning describes environments where there are deliberate levels of both face to face and technology mediated communication. The exact amount of these forms of communication can be chosen to suit the situation at hand.

McArthur (2001) argues that in any blended learning setting one should take account not only of the technology use but also the blended learning strategy. The forms of strategies guiding the use of blended learning have potentially large impacts on the learning achieved. Franks (2002) describes a four-stage model for instructors implementing a blended learning approach that moves from (1) an initial mode that simply provides administrative information on a course, (2) through a communications element, (3) leading to materials delivery, and, finally, (4) a more

engineered and deliberate use of technology for particular learning needs. Any attempt to use blended learning to support engaged learning would represent an activity at this extended stage of this implementation cycle.

Learning designs for blended learning environments

Whilst it is a relatively easy process to provide broad descriptions of blended learning settings in terms of the relative level of activity of the teacher and the technology, it is a much more difficult task to describe the detail of appropriate learning environments. What is needed is a *learning design* (eg. Britain, 2004), a deliberate set of learning activities and processes to provide the cognitive engagement a learner is deemed to require in a learning experience to bring about the required conceptual change associated with the planned learning outcomes (Kalantzis & Cope, 2004). Learning designs can be described at the level of a whole subject, subject component or learning resource (eg. Hedberg, Wills, Oliver, Harper & Agostinho, 2002). Boud and Prosser (2002) argue that high quality learning activities must demonstrate four principles: engagement of learners; acknowledgement of context; challenge for learners; and the involvement of practice. Blended learning offers opportunities to deliver on a number of these needs.

E-learning settings across all sectors of education have long been criticised for their limited and shallow learning designs (eg. Mioduser, Nachmias, Oren, & Lahav, 2000). 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 designed to promote engagement. More recently, learning designs have

In a large study of technology-based learning examples undertaken in Australia in 2003, a number of different learning designs supporting quality learning experiences were identified and described and exemplars included into an online database (AUTC, 2003). The database was designed with supporting information and resources to facilitate the implementation of the learning designs by teachers in areas beyond their immediate contexts (Figure 2). Within this database, quality learning designs are all characterised as being forms of problem types derived from the work of Jonassen (2000). The learning designs are based on problem solutions of either a rule-based, an incident-based, a strategy-based or a role-based form (Oliver, Harper, Hedberg, Wills & Agostinho, 2002).

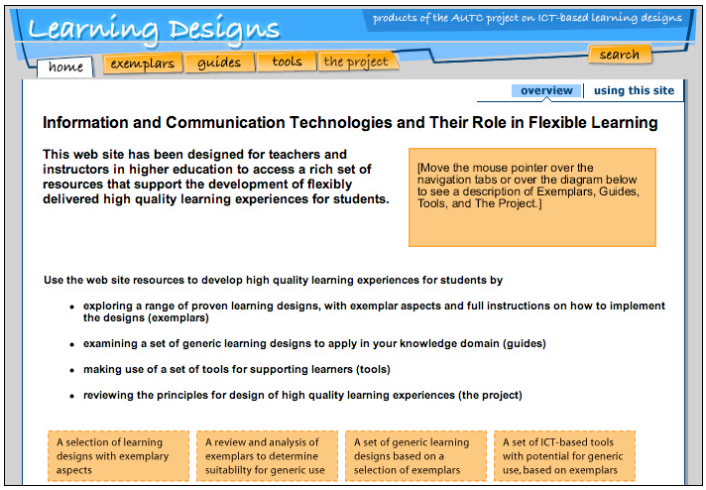

Figure 2: ICTs and Their Role in Flexible Learning. A repository of high quality learning designs for e-learning http://www.learningdesigns.uow.edu.au (AUTC, 2003).

Designing Effective Blended Learning Settings

Developing blended learning environments that seek to produce the high-order learning outcomes sought from university studies involves a deliberate design process. Previous studies have demonstrated the utility and efficacy of a simple framework describing tasks, resources and supports as a successful means to describe and plan such learning designs (eg. Oliver, 1999). The following sections describe work undertaken by the author and his colleagues across these three key elements that can provide guidance for others looking to design and develop blended learning environments as the basis for the use of technology in teaching and learning in higher education.

a. Learning Tasks

Authentic learning provides a strong learning design framework for elearning and online applications higher education. The principles underlying the design of authentic learning experiences are grounded in the philosophy of constructivism, and more specifically situated learning theory (Brown, Collins & Duguid, 1989; Lave & Wenger, 1991: McLellan, 1996). In our research, we have identified and demonstrated ten design principles that characterise an authentic learning task and activity (Table1.) These design principles provide a useful guide to teachers looking to create meaningful tasks for blended learning settings. Their successful application has been shown to lead to highly effective learning settings with strong roles and places for technology (Herrington, Oliver & Reeves, 2003).

There are a number of strong examples of authentic learning environments that teachers in higher education can use to guide and inform their blended learning design and development

activities with technology for elearning settings. We have established a Web site that showcases this learning design and provides access to a number of supporting resources and ideas. (http://authentictasks.uow.edu.au).

Table 1: Characteristic of authentic activity (Herrington, Oliver & Reeves, 2003).

1.	Have real-world relevance
2.	Are ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity
3.	Comprise complex tasks to be investigated by students over a sustained period of time
4.	Provide the opportunity for students to examine the task from different perspectives, using a variety of resources
5.	Provide the opportunity to collaborate
6.	Provide the opportunity to reflect and involve students' beliefs and values
7.	Can be integrated and applied across different subject areas and lead beyond domain-specific outcomes
8.	Are seamlessly integrated with assessment
9.	Create polished products valuable in their own right rather than as preparation for something else
10.	Allow competing solutions and diversity of outcome

A very strong example of an authentic learning tasks designed to these specifications is Research Methods (Angus & Gray, 2002). Figure 2 shows the interface to this unit which helps students to learn about educational research methods through an authentic tasks which sets them as a educational researcher. The online setting provides the necessary supports and resources to facilitate this active and engaging learning setting.

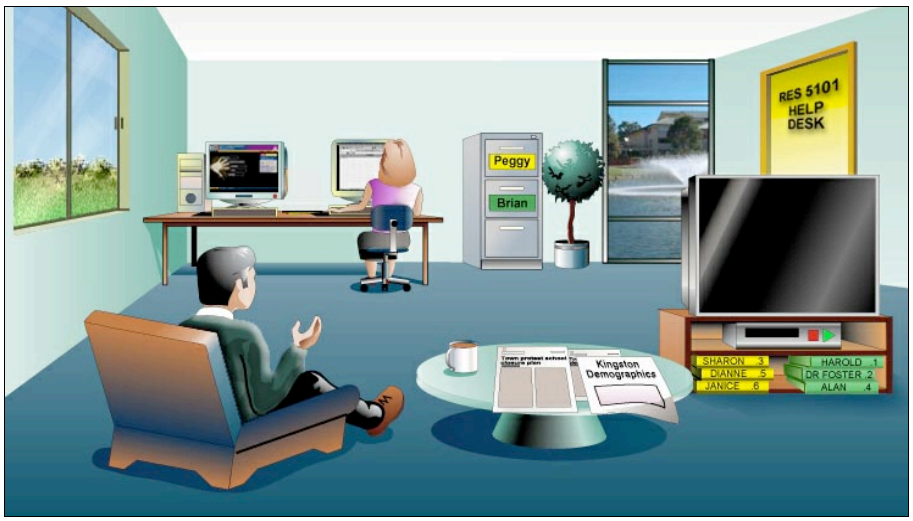

Figure 3: Research Methods (Angus & Gray, 2002).

b. Learning Supports

Blended learning environments have particular needs for strong learning support systems. Learning supports provide learners with the capacity to interact with systems, peers, mentors and teachers in the learning process. Students in blended learning settings can derive many benefits from well supported learning strategies. They frequently strive for the company of their co-

learners and often they seek the support and involvement of a tutor to facilitate and guide their learning experiences. A number of writers argue quite strongly that effective learning settings must involve such forms of learner support as mentoring, modelling, coaching and scaffolding (eg. Dennen, 2002). Providing these supports in blended learning settings can be achieved through many means and to many different levels and has been the focus of considerable research in recent years (eg. Salmon, 2002).

The provision of support mechanisms for students in blended learning 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 2004).

Research is continually discovering and demonstrating innovative technology-facilitated strategies and tools that provide learning opportunities and enhancements over conventional forms. Figure 4 showcases MarkUp, an innovative tool that assist learners to make meaning from readings. Learners are able to post their thoughts and reflections, a sticky notes, into an online document and to view and share the postings made by others. When use of this tool was investigated with learners, the act of marking-up readings in a deliberate fashion and reviewing others' comments was found to provide strong supports for reading comprehension and the development of learners' metacognitive skills (McMahon & Oliver, 2004).

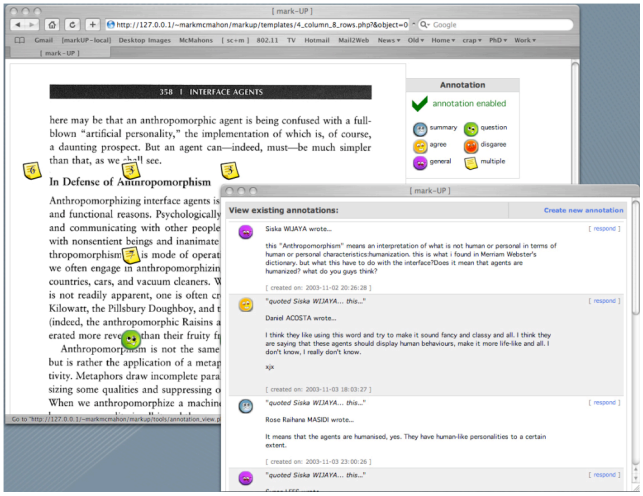

Figure 4: Markup, an online tool facilitating reading comprehension and shared viewpoints

c. Learning resources

The learning resources in blended learning settings provide the content and course materials that learners access to achieve the planned learning outcomes. In learning settings that are technology-facilitated, there are substantial amounts of course material provided for learners and the factors of the materials that influence quality are in most instances 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;
- Appropriateness of media usage; and
- The relevance of the resources.

In recent times, a growing awareness has emerged of the duplication and proliferation of online resources and much has been written recently on the topic of reusability as both a design and development strategy for online learning materials and as a general approach to the use of digital resources for teaching and learning (eg. Downes, 2000). 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 (eg. Downes, 2000; Shepherd, 2000).

There has been a huge amount of work undertaken by a number of large organisations and groups to facilitate the reusability and interoperability of digital learning resources, learning objects. For example, IMS Global Learning Consortium, ADL, IEEE. This work appears to be removing many of the barriers which have previously limited reuse of learning resources. The work being done to develop the Sharable Content Object Reference Model (SCORM) is a strong case in point. SCORM has been developed by the Advanced Distributed Learning (ADL) initiative and provides a design and development model for learning resources which strongly supports reusability and interoperability (SCORM, 2004). Discovery of stored resources is facilitated by the use of learning object metadata and shared vocabularies to provide descriptors for resources which can be used in the discovery process (eg. LOM, 2002; LTSC, 2005).

Figure 5 shows the Flexible Learning Toolbox digital repository developed as part of an Australian project involving the large scale development of e-learning resources for use in the vocational and educational sector. The project explored appropriate design and development strategies needed to support the storage, discover and reuse of digital resources designed for specific settings. Many factors were found to influence the reusability of the resources and guidelines were prepared to guide developers and designers seeking these outcomes (Brownfield & Oliver, 2003).

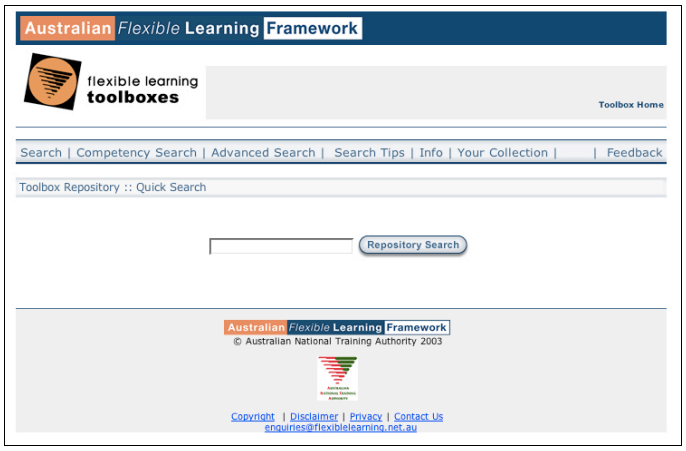

Figure 5: The Flexible Learning Toolbox digital repository facilitating the discovery and reuse of learning resources http://flexiblelearning.net.au/search.asp (FLAG, 2003).

There are many factors that contribute to the quality of learning resources and among these many are particular to the digital resources that support blended learning. As more and more developers contribute to the growing number of learning objects in accessible digital repositories, there will be increasing benefits to improving teaching and learning. Access to high quality resources for teaching and learning enables teachers to concentrate as they develop their course materials on the selection and implementation of appropriate learning designs. Hopefully we can expect in the future that the outcomes of contemporary research and development in these areas will return the gains needed to influence mainstream teaching and learning in a positive fashion.

Summary and Conclusions

An essential component of any successful learning environment, be it technology-facilitated or not, is the level of engagement that the setting engenders in the learner. Many examples of learning today in higher education still fare lightly on the levels of learner engagement they develop and support. Technology use in learning setting has frequently shown to produce the conditions that potentially can support learner engagement. This paper has explored one such form of technology support for learner engagement, in the form of blended learning. Blended learning settings include technology and teacher involvement in mixes appropriate to the learning conditions. This paper has discussed and described important elements of blended learning settings and provided examples that showcase successful learning environments using these elements.

KEYWORDS
Blended learning, online learning, learning designs, higher education, elearning

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