Analysing the efficacy of blended learning using Technology Enhanced Learning (TEL) and m-learning delivery technologies

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The developing ubiquitous nature of information communication technology (ICT) offers opportunities and benefits in the educational field when blended with more traditional approaches to learning and teaching, they include: monitoring of on-line activity, rich administrative support, repository of learning materials, multiplicity of assessment options and strong collaborative tools. Additionally, it is common for third level students to have excellent internet access on campus, in university residences, and at home. This technological strength coupled with the high level of ICT literacy of today's student makes blended learning an attractive option. In order to obtain maximum benefit from such a blended approach students must log-on to the learning environment regularly to see new information and maintain their collaboration, a discipline they do not easily adopt. Two ways of encouraging such engagement, the first of which is tested in this paper, are technology enhanced learning notification methods and m-learning announcement means. The TEL notification method is discussed and tested through a student survey (COLLES) to determine the students' perception and preference.

Keywords: learning environment, blended learning, m-learning, technology enhanced learning, COLLES, learning management system.

Introduction

Learning environments can strongly influence student outcomes and play an important role in improving the effectiveness of learning. However, there is a plethora of learning environments available at present, from freeware (open source) (ComputerScope, 2004) to proprietary models. This research is not focused on choosing an appropriate learning management system for the teacher and their students; rather, it is focused on exploring the best delivery notification means that can be implemented for the systems users. This paper will use an open source learning management system called moodle (Moodle, 2001) as its test-bed. The first stage will focus on technology enhanced learning as the delivery medium in conjunction with the learning environment. The second stage will function with m-learning as the delivery medium in union with the learning environment.

Each stage is followed up with a Constructivist On-Line Learning Environment Survey (COLLES) in which the class submits feedback on the new learning experiences obtained over the term. The use of the local area network within the university offers academics a simpler, more streamlined method for the protection and collection of the data (Mertler, 2003). The learning environment analyses the data and provides instantaneous feedback with graphical representations depicting each of the sections within the survey (Dougiamas & Taylor, 2002).

This paper is a work in progress. It centres on the student viewpoint based on a technology enhanced learning approach and their perceptions of this sole delivery method. 16 students completed the survey and the results are discussed later in the paper.

Learning environments and blended learning

Learning environments, with a blended learning approach towards teaching, is supporting more and more courses nowadays (Jonassen, 1999). With respect to this paper and research, blended learning is using online resources such as learning content, assignments, collaboration tools and assessment features in parallel with the more traditional face-to-face means of lecturing. Course content was covered in the classroom with the students face-to-face and the learning environment was used to refresh the material in

the form of quizzes, assessments and projects. This permitted the students to gain a deeper understanding of the knowledge being imparted to them(McHugo & Hall, under review). Blended learning has the best of both worlds in terms of conventional teaching methods and an e-learning system. Conventional teaching shortfalls can include the students being tied to a rigid timetable, time restraints on access to the laboratory and equipment and being dependant on tutors for problem solutions. These points can all have negative impact on a student's problem solving skills.

Blended learning and the associated learning environment provides an informal environment for students to study and learn in. Material is made available and accessible to all students regardless of their location and time zone. There are no time constraints on viewing said material and exercises and lab work can be started, saved and continued until a satisfactory outcome is reached. Discussion forums and other collaborative features exist to support the students in their learning, whether it is from the tutor himself or the other engaging students within the class(McHugo & Hall, under review).

Constructivist on-line learning environment survey (COLLES)

The COLLES was designed to help assess the extent to which web teaching enriches distance or online student's ways of knowing. The survey has the potential to generates a measure of a student's perception of both their preferred and actual on-line classroom environment (Taylor & Maor, 1999). COLLES was developed from its three-scale predecessor, the Constructivist Virtual Learning Environment Survey (CVLES) (Taylor & Maor, 1998) to measure questions about the quality of online learning environments from a social constructivist perspective in an effort to ensure that "technological determinism doesn't overshadow sound educational judgement" (Taylor & Maor, 1999) in online or distance education.

There are three options within the survey. These include a preferred form, an actual form or a combined preferred and actual form. The preferred form asks a student about their preferred or ideal experience in an online learning course. The actual form helps the teacher understand how well the online delivery of the material helped the students to learn. The preferred and actual form is a comparison of what they were looking for and what they got and an analysis of the difference, if any, between the two. The responses of the students to any of the forms helps improve how the material is presented to them in the online learning environment. Because the form was administered at the end of the semester the third form – the preferred and actual form – was made accessible to the students. The COLLES scores a five-point Likert-type responsive scale with the score to the left of the value (Table 1).

Table 1: COLLES survey scale

1	2	3	4	5
Almost Never	Seldom	Sometimes	Often	Almost Always

There are six scales to the COLLES:

- *Relevance*: the extent to which engagement in the online classroom is relevant to the student's professional views and related practices.
- *Reflective thinking*: the level at which critical reflective thinking is occurring in association with online peer discussion.
- *Interactivity*: how the communicative interactivity is occurring online between students and between students and teachers.
- *Tutor support*: the degree to which challenges and communicative role modelling is provided by teachers.
- *Peer support*: the magnitude of encouraging support that is being is provided by the teachers.
- *Interpretation*: the point to which students and teachers co-construct meaning in a congruent and connected manner.

Preliminary findings

Initial testing was carried out on a group of 16 students studying a programming language module during the second semester, in the second year, of a four year degree course. The students had access to the learning environment both on and off campus. Laboratory problems and solutions were available online in addition to the learning material. Assignments were set, reviewed and marked based on a given timeline that coincided with the learning material. In class assessments were also administered to the students throughout the semester. Grades were automatically awarded based on the students quiz answers. Presentation skills were also part of the syllabus, utilising the learning environment as a medium through which the students delivered their work to the rest of the class.

Non-response rates to internet surveys could be an issue and could be affected by technical issues such as client software used, choice of internet browser, client operating system and the reliability of Service Providers. However this was not a problem for us. The university has a standard build on all computers on campus. This, in turn, removes the issue of client software, internet browser and operating system. They are the same across the board and tried and tested before the semester starts. The Service Provider is supplying the necessary bandwidth for all the university related internet activity and as much is deemed reliable. Figure 1 shows the class mean scores on six scales for both the preferred and actual forms of the COLLES which were administered towards the end of the 13 week teaching semester.
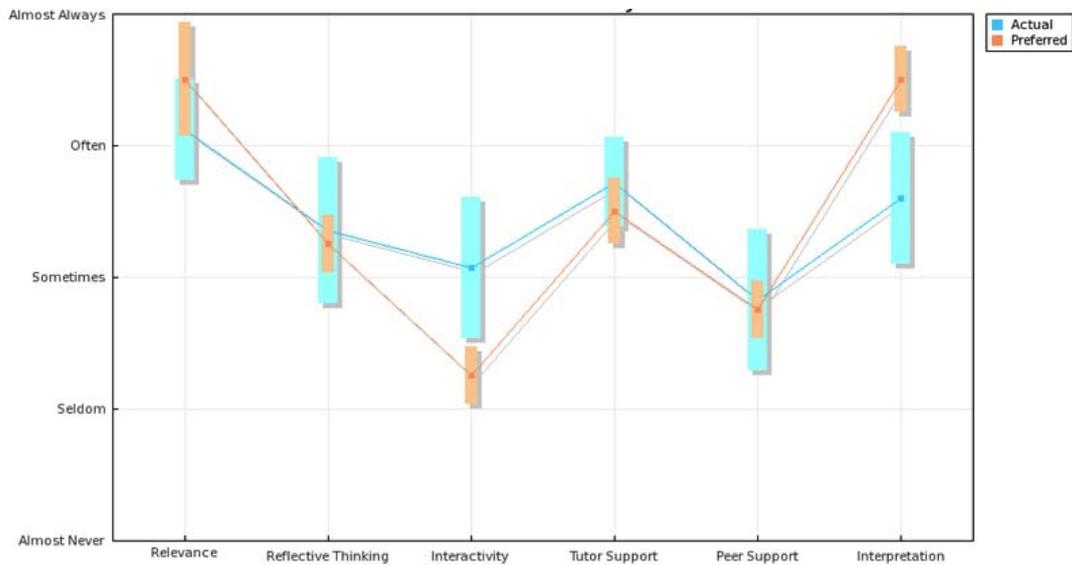

Figure 1: COLLES survey summary

Survey analysis

Students have indicated high expectations towards relevance and interpretation. They expect their online learning almost always to be interesting and directly related to their professional practice (mean = 4.5); and they perceive that this occurs very often (mean = 4.1). Their expectations that they and their fellow students and lecturers very often (mean = 4.4) make good sense of the messages posted are relatively close to being realised in practice (mean = 3.6). This suggests that online (asynchronous) communication is very comprehensible and meaningful.

Students prefer to be engaged sometimes in thinking critically about their ideas and their fellow students' ideas (mean = 3.2). Their expectations of the lecturer towards encouraging, praising and valuing their online support shows that the students are individually co-ordinated and capable or working on their own initiative (mean = 2.7).

In general, students' preference for the online lecturer to frequently (mean = 3.4) provide tutor support are close to being met in practice (mean = 3.6). One might expect that students would value highly the

opportunity to interact often with fellow students, a general preference was indicated for this to occur just above seldom (mean = 2.3). Given that students were engaged in online assessments, in-class questions, individual and group assignments, topic changes and presentations, it was somewhat surprising that the class perceived that only sometimes did they have the opportunity to engage in an exchange of ideas with other students (mean = 3.1). As shown in figure 1, there is little variability between preferred and actual expectations from the students on their overall online learning experiences.

Conclusions

Mid way through this research and thus far the findings, based on the survey, are interesting. The students are engaged within the learning environment and within the classroom. The notification method thus far has proved successful based on assignment, assessment and laboratory deadlines throughout the semester. Students have uploaded their material on time or they have been notified of any changes to schedules with the minimum of disruption. The second phase will commence in the fall of 2006 based on m-learning technology. Both classes selected have an engineering background and the topic areas are focused on programming languages in order to keep the findings more relevant.

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Bionotes

Kevin Johnson has a degree in Electronic Engineering and an MEng in Computer Engineering from the University of Limerick. He obtained his PhD in 2004. Since then he has worked on the Consortium for Open Source in the Public Administration (COSPA) project, and is currently employed by the Programme for University Industry Interface (PUII) within the university. He also lectures within the Electronic and Computer Engineering (ECE) Department in the University of Limerick.

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