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INTEGRATING REAL AND VIRTUAL LEARNING SPACES

Allison Littlejohn
Centre for Academic Practice,
University of Strathclyde, Glasgow, UK
allison.Littlejohn@strath.ac.uk

Abstract

Undoubtedly, the widespread introduction of Learning Management Systems over the past few years has had significant impact on online learning by enabling lecturers to easily upload and disseminate learning resources, as well as providing the potential for new forms of online interaction. However, LMSs have had significantly less impact upon the sorts of interactions that can occur in class: both lecturer-student and student-student. This article considers ways in which campus based students can benefit from the integration of real life and virtual interactions. It reflects upon lessons learned from the use of a prototype Learning Management System and explores ways in which virtual and real spaces may combined to address specific academic needs. This is illustrated in two scenarios that outline ways in which virtual learning spaces may be integrated with face-to-face teaching within a campus based context. A third scenario offers a glimpse of future integration of real and virtual learning spaces which allow students to develop and share learning resources. Finally, a set of common principles underpinning the development and support of these methodologies are outlined.

Keywords

digital repositories, Learning Management Systems, staff development

Implementing a Virtual Learning Space

Over the past few years in Higher Education, e-learning has largely focussed upon Learning Management Systems (LMS also referred to as Virtual or Managed Learning Environments, VLE/MLE). These provide an efficient means by which courses can be managed. However, many institutions implementing these systems are experiencing major limitations, particularly in terms of how these learning environments are presented to academics as a means by which they can address specific learning and teaching issues. Effective learning environments should encourage, support and integrate the wide range of social interactions involved in collaborative learning, but this is not always the case. The following case study highlights some common limitations in implementing a Learning Management System.

The Clyde Virtual University (CVU) is a prototype Learning Management System which was implemented in 1996 to link six Higher Education institutions in the West of Scotland. CVU held great promise in terms of the collaborative sharing of a rich variety of learning resources. It was based on the metaphor of a "bricks and mortar" university (Figure 1). This metaphor provided a conceptual framework which enabled those new to e-learning to easily link real and virtual spaces (Littlejohn and Sclater, 1999). Educational content in a variety of formats could be placed in the *lecture theatre*. The *library* provided links to online resources of the four universities. The *virtual café* was a forum for online discussion, using bulletin board software and the *assessment hall* offered access to computer aided assessment software. Assessment and registration could be administered via the *administration office*.

Most tutors initially used the Clyde Virtual University as a content repository. Some courses incorporated student feedback through formative computer aided assessment while other courses focussed around

collaborative student learning, integrating online discussions. However, these were relatively uncommon. Closer examination revealed two main barriers to the development of courses. Ironically, the "bricks and mortar" metaphor which proved useful to those new to e-learning had a restrictive influence on the development of a wide variety of courses. As a result, only the most experienced e-learning teachers developed courses extending beyond the metaphor. Secondly, this Learning Management System did not appear to directly address some needs identified by academics, leading to limited "buy-in" of the system.

In order to overcome these difficulties, central staff support programmes underwent a significant review. Previously the Learning Management System had been offered primarily as a "service" for the academic community. However, plans were outlined to bring central staff support closer to individual academic needs through working in closer partnerships with departments. Methods of integrating virtual environments and real environments were explored in order to satisfy the requirements of campus based learners and teachers. These methods are presented as scenarios, each of which identifies an academic need and outlines how this was resolved through the integration of real and virtual learning spaces.

Figure 1: The Clyde Virtual University

Scenario 1: Active Learning

The problem of student inactivity in lectures has particularly affected large classes. Although learning is a social process (Palinscar, 1998), first year students are being taught in increasingly large classes. This leads to social alienation and limited opportunity for dialogue, resulting in poor understanding of concepts. A two-staged approach was adopted to resolve this issue. Initially, a survey of student attitudes to study was undertaken on the first of entry into university - at student induction. This provided surprising results: students anticipated that learning at University would be by passive methods and did not link their use of technology for social purposes with use of technology for learning. Subsequent to this study, a new approach to student induction was developed to encourage peer interaction through use of a technology. During short (three hour) induction sessions, students were asked questions regarding their previous experience and attitudes to study, for example, were they the first in their family to attend university study. The students were invited to respond to these questions using the Personal Response System (PRS) illustrated in Figure 2.

Figure 2: the personal response system

The PRS system is based on a series of Infrared (IR) sensors at the front of the class. When the students are posed a multiple choice question, they are given a set amount of time to answer (anything from 2 minutes to 15 minutes). The students respond by pressing a key on a hand-held set, similar to that in Figure 2. The IR sensors detect the students' responses and relay these to the lecturer's laptop. The responses are collated and can be instantly displayed as a histogram on the screen. Since each handset is numbered, the lecturer has a record of each student's response.

A related methodology, known as Concept Testing (Mazur, 1997) has been used within a range of academic departments at Strathclyde. This methodology involves asking students multiple choice questions at regular intervals during

a lecture session. These questions are designed to test the students' understanding of particular concepts. Students can respond in one of two ways. They can answer individually, then justify their answer to a peer.

Alternatively, students may be invited to discuss the question in groups prior to indicating their response. This methodology has been extended for use in Interactive Studios: small lecture theatres that have computers available to students. After answering questions, the students can carry out group activities by accessing resources and simulations within a Learning Management System, which can be accessed via computers located within the Studio. This links the real classroom environment with virtual space. This approach has led to improved class dynamics with students having opportunity for dialogue and feedback, though there are still issues to be addressed, with some tutors expressing concerns over less material being "covered" in class.

Scenario 2: Collaborative Learning

A problem identified by academics supervising student group projects is poor critical reflection and planning of group projects. Students are inexperienced in assigning roles to group members and timetabling activities. As in the first scenario, a two staged approach was adopted. Firstly, tutors required students to provide an online, weekly account of the progress of their project. Secondly, the students were given support in designing and constructing digital project portfolios, this included developing appropriate IT skills. This initiative was supported by a team of staff including academics (setting tasks), educational developers (supporting students in structuring project portfolios) and IT trainers.

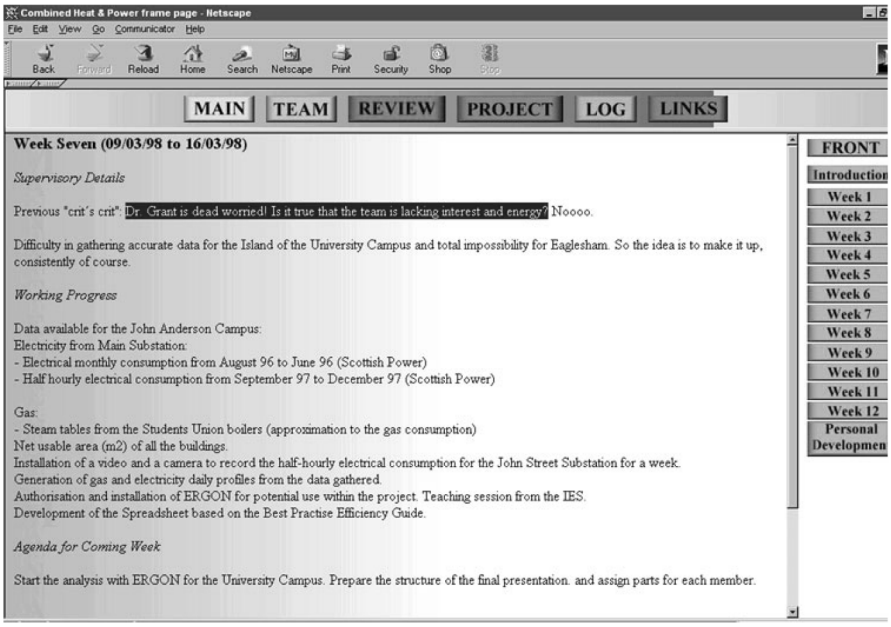

FIGURE 3: project log

Figure 4 shows an example of a project portfolio. The portfolio is arranged in a series of sections outlining information about the project team, a repository of digital assets related to the project, a week-by-week progress report, a literature review and links to external sites. The weekly progress report illustrates that, when the group supervisor identified poor progress, steps were taken to reflect upon how to address the problem and a new action plan was drawn up. Evaluation studies demonstrated that the students clearly identified the transferability of this methodology to other parts of their learning (Stefani et al, 2000). Though issues still exist in terms of students managing information, as outlined in scenario 3.

Scenario 3: Collaborative Learning

This scenario is based upon research which is currently being funded by the UK Government, through the Joint Information Systems Committees (JISC) and the US National Science Foundation, with project partners at the Universities of Strathclyde (UK) and Stanford (USA). The problem identified in this scenario occurs during group design projects - a requirement of every engineering undergraduate. Students are required to source and assimilate large amounts of information, requiring students to develop excellent information handling skills. This project aims to examine how students can best develop these skills and how they can manage information, both formal (e.g. from libraries, reference manuals etc) and informal (student sketches and ideas, etc). This work is based upon previous research on digital repositories (Campbell, Littlejohn and Duncan, 2001) and shared workspaces (Nicol and MacLeod, 2003).

Engineering students at Strathclyde currently use shared workspaces, such as BSCW, to arrange and store a variety of digital resources useful to their projects. This includes images created through the use of shared whiteboards; articles from digital libraries; documents sourced through the Internet; as well as illustrations and photographs. These can be accessed via shared, wireless laptops or networked desktop computers, which become a focus for group discussions. A major problem is that, although some groups can manage resources well via the shared workspace, others may store these resources on a shared computer. This leads to unequal sharing of resources, which can be fatal if the computer breaks down. Although the shared workspace allows students limited organisation of resources, it does not have the flexibility of a digital repository, which allows searching. It is hoped that, in future, a shared workspace may be linked to a digital repository. Students may use the shared workspace to store "work in progress" documents, while more formalised resources could be uploaded to a digital repository. Major issues which are likely to arise and are currently being investigated include encouraging resource sharing across student groups; managing the flow of information from the "informal" to more "formal" storage; describing resources with metadata; and classifying resources within the digital repository.

Analysis: Five guiding principles to enhancement

Comparing the future scenario with past use the prototype Learning Management System highlights five common principles which have enhanced staff support by bringing it closer to identified academic needs. This analysis highlights that staff support should be:

1. Responsive to academic needs and institutional strategy;
2. Fully evaluated during the implementation process to allow for continual improvement;
3. Each stage should be built upon incrementally;
4. The project supported by interdisciplinary teams and
5. Should focus on learning rather than teaching issues.

These guiding principles have been used at the University of Strathclyde to underpin an effective staff support system that has high impact across a range of academic departments. In comparison, the previous approach of providing an LMS as a service had low impact over a range of faculties and departments. We believe that both approaches are necessary for an e-learning, leading to better integration real and virtual learning spaces, thereby optimising the learning environment for campus based students.

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