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A visualisation tool to aid exploration of students' interactions in asynchronous online communication

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ABSTRACT

Much research in recent years has focused on the introduction of virtual learning environments (VLEs) to universities, documenting practice, and sharing experience (Armitage, Browne, & Jenkins, 2001; Browne & Jenkins, 2003; Moron-Garcia, 2004; Weller, 2007). Attention has been directed towards the importance of online dialogue for learning as a defining feature of the VLE.

Communicative tools are an important means by which VLEs have the potential to transform learning with computers from being passive and transmissive in nature, to being active and constructivist (Pavey & Garland, 2004). However, practical methods of reviewing and analysing online communication to trace cycles of real dialogue (and learning) have proved somewhat elusive. Qualitative methods are also underused for VLE discussions, since they demand new sets of research skills for those unfamiliar with them, and can be time intensive.

This paper describes a visualisation tool to aid the analysis of online communication. The tool has two purposes: first, it can be used on a day-to-day basis by teachers or forum moderators to review the development of a discussion and to support appropriate interventions. Second, the tool can support research activities since the visualisations generated provide the basis for further qualitative and quantitative analysis of online dialogue.

The visualisation software is designed to encode interaction types simply and quickly. The software was tested and then used to analyse data from a sample of forums within the Moodle VLE. The paper discusses both the method of visualisation and analysis of the online interactions as a pilot for further research analysing interaction in discussion forums.

1. Introduction

In this paper we present a visualisation tool to support the analysis of student dialogue in asynchronous discussion forums. We propose that this tool, aside from providing a visual representation of an online discussion, can also analyse the extent of involvement of the participants, thereby giving a detailed picture of the communication pattern. This tool can help teachers or moderators to intervene in the discussion if necessary, changing the participants' focus and activity. Furthermore, the visualisations generated can support deeper analysis, including qualitative and quantitative research, into student learning in online discussion forums. An expanded toolkit for the analysis of online discussion forums would enable researchers to address the wider research question of whether and how people learn from asynchronous discussion forums, such as those provided in virtual learning environments/learning management systems (VLEs/LMSs). We argue that the visualisation software presented here supports more detailed and reliable analysis of forum messages, and therefore represents a valuable addition to the available tools and methods.

Almost all (HEIs) in the UK and Ireland have institutional VLEs (Browne & Jenkins, 2003; Weller, 2007). Although definitions differ, VLE in this context is the label given to a system that can store teaching materials, readings, web-based resources and course information shared between staff and students in different courses of study. In addition, VLEs commonly provide tools to support online activities including quizzes, assessments, communication between students, and between students and lecturers, and some tools in support of groupwork (e.g.

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virtual presentation spaces, collaborative writing spaces, wikis and blogs). Blackboard/WebCT (http://www.blackboard.com), Moodle (http://www.moodle.org/), and Sakai (http://sakaiproject.org/) are amongst the most widely used VLEs currently. VLEs provide the means to support learning in practical ways associated with information and content management, but also have the potential to offer transformative approaches to teaching and learning, facilitating synchronous and asynchronous dialogue between participants and their teachers.

Much has been made of the potential for VLEs to facilitate online dialogue. If learning is viewed as socially situated in nature (Lave & Wenger, 2002; Lea & Nicoll, 2002), then dialogue becomes an important means by which meaning is negotiated and knowledge constructed. However, research examining the effectiveness of computers in education has frequently identified examples of where computers (and latterly the web) have supported a somewhat transmissive approach to learning and teaching (Pavey & Garland, 2004). Laurillard's (1993, 2001) conversational framework, drawing extensively on educational theory, proposed that technologies should foster dialogue between teachers and students, and between students themselves, so that dialogic processes were supported, and knowledge was co-constructed. While research in e-learning has yielded good examples of how communication tools in VLEs have enhanced or indeed radically altered teaching in a range of subjects (Herrington, Oliver, & Reeves, 2003), these cases tend to be exceptional rather than general experiences. More recently, Goodfellow and Hewling (2005) have questioned whether participation in online forums can be said to demonstrate learning. The research question arises as to whether VLE forums are fit for the purpose of supporting the conversational model of learning proposed by Laurillard (1993, 2001). Additional analytical tools are needed in order to address this question. In terms of practical day-to-day activities, VLEs lack tools to facilitate quick and clean overviews of busy forums. Finding time to navigate and review large numbers of discussion threads in which there is frequent activity is a well-documented problem for teachers using VLEs (Fitzgibbon & Jones, 2004; Hamuy & Galaz, 2010; Karasavvidis, 2009).

This paper describes the design and implementation of a diagnostic tool which provides simple visual representations of the exchanges in asynchronous discussion forum threads. The visual representation is shown within a webpage, with hyperlinked nodes displaying the body text of messages posted to discussion forums. These graphical images might assist a teacher or moderator to intervene in the discussions whenever necessary, and the visual representations of online discussions can support researchers undertaking further analysis. Two of the authors (Jyothi, Keating) were involved in the technical development of the software, while the third (McAvinia) is a learning technologist supporting staff and students using Moodle. In collaboration we were able to test this software with a sample of moderated and unmoderated forum exchanges from Moodle, for four courses at undergraduate level in Humanities subjects and one e-moderation course for lecturers (co-ordinated by McAvinia). We will discuss our initial findings in terms of the usefulness of the software as an analytical tool, and in terms of some preliminary observations about student learning. We consider what the visual analysis of the forum threads might show about the effects of moderation by online tutors in each subject. Finally, we describe the current development and future testing of this software.

2. Research context and rationale

2.1. Institutional context

The authors are all located at NUI Maynooth in Ireland, and this research was prompted by our interest in exploring some of the effects of the introduction of an institution-wide VLE at the university. NUI Maynooth has three Faculties encompassing Humanities, Social Sciences, Science and Engineering subjects. It has a student population of just over 8000. Courses at undergraduate and postgraduate levels are modular, and teaching is predominantly face-to-face, through lectures, tutorials and practical sessions. Most students are full-time participants in undergraduate courses which they attend on campus. Attendance at timetabled teaching events is expected. However, there is increasing interest in blending this 'traditional' teaching model with other modes of teaching and learning: changes in the student body, with increasing numbers of part-time and international students, are leading to greater use of learning technologies. The university adopted Moodle as its institutional virtual learning environment in 2005. In common with many VLEs, Moodle provides tools for content presentation, storage and management. It also offers discussion forums, chat rooms, instant messaging, assignment and quiz tools, course wikis and individual student blogs. All taught modules automatically have a space created for them in Moodle, with students having access to these spaces automatically after registration. The decision whether or not to use the VLE remains with lecturers and tutors and with their departments. Additional Moodle spaces have been created for staff in the Library and in offices undertaking learning support, career development and staff development activities. There are around 8000 independent student logins each week, and student use of the system is now pervasive. Patterns of VLE adoption are broadly similar to those of other institutions (Kirkup & Kirkwood, 2005; Smith, 2005), with the initial drive being towards support for existing processes (in particular, the sharing of course materials) rather than changes to learning and teaching.

Evaluation of the use of Moodle in its first four years had been undertaken, and prompted us to undertake this research to explore the use of forums. The evaluation data from students and staff had shown that the reported benefits to students of using Moodle were predominantly practical, and related to the availability of course materials online. However, the students' responses also indicated extensive use of the Forums within their courses. One unexpected finding was the extent to which students used unmoderated Forums in Moodle. *News Forum* spaces (created by default in each course space in Moodle) have been used independently by students to discuss coursework, assessment and other issues. This unmoderated use of Forums in Moodle predated the popularity of social networking sites such as Facebook (http://www.facebook.com). The evaluation data suggested that students valued both moderated and unmoderated discussions. The use of unmoderated forums, in particular, was interesting as a possible site for informal learning. Therefore, we decided to explore further the interactions taking place in both moderated and unmoderated forums, and to examine whether these forums were potential supports for learning.

2.2. The role of computer-mediated asynchronous communication in learning

Asynchronous communication or computer-mediated communication (CMC) has been the subject of extensive research from different perspectives (Bratitsis & Dimitracopoulou, 2008; Gant, 2007). Much of this research has focused on the use of online communication to