Course Design, Delivery of Assignments and the Level of Engagement with Social Software: Early Results and Research Perspectives

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Abstract: The uptake of social software is becoming more widespread in many sectors of education and organizational development. However, there is little empirical research on the impacts of adopting these technologies, and so it is difficult to determine appropriate pedagogic models and whether or not the desired learning outcomes are being realized.
This paper reports early findings of an ongoing pilot study which is based on the concept of collaborative learning and supported by means of social software. It describes the educational philosophy behind the study and the teaching techniques used. The application of various features of social software, including blogs, file management and personalization, are discussed, as well as the different techniques for facilitating and measuring the level of student engagement with social software. The results indicate that student engagement with social software can be shaped by course design and activities that integrate educational technology into the course structure.

1. Introduction

The development of information technologies is powering the evolution of the Internet and communication means. The transformation of the internet into the so-called Web 2.0 enables users to be not only information consumers but also content providers through a number of web publishing services such as blogs, photo albums and wikis (Chone 2005). Web 2.0 is a technological advance that promotes the growth of service-based applications and greater user-control over content and connection (O'Reilly 2005). The rapid growth in membership of social spaces such as MySpace, Flickr, del.icio.us and others show that web-based networking is becoming an important part of our daily life (Jacobs & Polson 2006).

Given that people are apparently willing to collaborate, work and spend leisure time on-line, a number of questions arise. Do these changes affect the knowledge acquisition mechanisms? Should the educational system adapt teaching techniques, curriculum and teaching tools to raise the effectiveness of learning? And finally, what is the solution for effective and efficient education for the coming generation? The answers to these questions have become a major concern for many educators, researchers and educational software developers. This paper is based on the early observations of the pilot study which tries to explore the results of integrating social software and Web 2.0 technologies into an educational setting.

2. Aims and Objectives of the Research

The aim of the study was to observe the use of social software and virtual learning environment (VLE) within a collaborative environment that was designed to encourage an exchange of ideas, reflection and personal development. The objectives of the research were to:

- Create an open, collaborative environment which would encourage an exchange of ideas, reflection and personal development.
- Identify the most common patterns of using social software by the members of the target group.
- Compare the use of social software with the use of adopted VLE.

3. Theory Behind the Research

3.1 Collaborative Environments and the Social Aspects of Learning

The importance of discussions and exchange of ideas as part of a learning process are widely established. According to Dewey (Dewey 2004), learning is a social and interpretive activity in which learners collaboratively construct explanations and understandings of materials and artifacts. Followers of Vygotsky attach great importance to social context and collaborative activities for learning (Cole 2003).

Acceptance of a social dimension to learning led to the concept of Collaborative Learning or Cooperative Learning. This describes a form of active learning in which students work together in small groups toward a common goal (Gokhale 1995), utlilizing group discussions, long-term group projects, and group testing (Castor 2004). Roger and David Johnsons, the adherents of collaborative learning, state that exchange of ideas and opinions promote critical thinking and increase motivation (Johnson, Johnson et al. 1998). Moreover, according to Samuel Totten, it is essential for the development of critical thinking, that students take responsibility for their own learning by participating in discussions (Totten 1991). Many authorities on educational practice recognize the importance of social interchange; Resnick, Pea and Perkins presented their view on learning as a "dialogical process involving the social distribution of intelligence" (Schrire 2006). The collaborative learning approach has been adopted as a foundation for the course design on which this research is based.

3.2 Collaboration Supporting Technology

Advances in web technologies continue to improve the ways we communicate, share and distribute information. Attributes of Web 2.0 include greater integration of RSS/Atom feeds, cloudtags, mashups and rich internet applications as well as new ways and tools for managing content and for delivering services. By supporting openness, collaboration and information exchange, Web 2.0 provides the foundation for the growth of popular social spaces (Downes 2005).

Social software is a technological development that is still in its formative years, but it clearly offers great promise for society at large and in many areas of education in particular. It is social software's potential for fomenting dialogue, forming solidarities, coordinating action, distributing information and increasing understanding that make it an important tool for those invested in social equality (Mejias 2005). Social software in e-learning offers great pedagogical and practical benefits, both through the amplification and creation of inter-personal connections and through allowing users to take control of the learning process (Dron 2006).

These recent developments in web-based services and the enhancement of collaborative tools have fueled the demand for similarly specified educational software and services. Many schools and universities across the world have now deployed blogs, ePortfolios and educational social software for use by the academic community. However, despite the widespread promotion of these learning tools (Downes 2005), there is little information to validate the extent of their utilization by institutions, tutors and students or evidence-based guidance on best practices for promoting learning. Shedding light in these areas will help educators to make informed decisions concerning the appropriateness of tools and to modify teaching practices as necessary.

3.3 Pedagogical and Technical Platform for the Research

This study is based on the concept of collaborative learning and openness. It follows the educational philosophy of Dewey and Vygotsky and adopts a model of collaboration and cooperation among students and teachers. This is based on principles of social constructivism and the social nature of the learning process (Popkewitz 1998). While any learning process that is delivered within an effective collaborative environment can promote higher-level reasoning, process gain and transference of knowledge (McConnell 2000), social software has the potential for extending the collaboration to the level of using blogs, file exchange mechanisms and personalization. Hence, we can assume that a collaborative learning environment, enhanced by social software, can promote learning and increase the effectiveness of a learning community.

3.3.1 Technology Behind the Pedagogy

In order to create the necessary environment, a set of tools was identified, evaluated and then selected for their appropriateness for collaborative learning. These included the open-source software Elgg version 0.65, which allows "… users to establish personal digital-identities and connect with other people, collaborate with them and discover new resources through their connections" (Elgg 2004). Elgg possesses much of the typical functionality of social software and provides access to Web 2.0 features such as weblogs, RSS, tagging, mashups, personalization and file-sharing mechanisms. It therefore satisfies many of the technical requirements for this research, namely promoting information sharing, open collaboration, reflection, feedback and a sense of community.

The Moodle version 1.6 open source Virtual Learning Environment (VLE) was also selected on the basis of a student-centric architecture, aligning with principles of social constructivism. Core VLE and other functional modules extensively used during preliminary studies included: features for managing and distributing course resources, messaging course members, course planning and administration. The use of the Moodle system was coupled with the Elgg social software through a module called ePortfolio. All core course content and many additional materials and resources were provided on both Elgg and Moodle.

Most students (72%) attended the formal and introductory lecture on the technology, philosophy and principles of working with Moodle and Elgg. Support for learning tools was ongoing and was provided both in-class and electronically.

3.3.2 Openness and Reduced Competition

Openness is an important part of collaborative learning (McConnell 2000) and believed to be desirable for reasons such as encouraging learners to: share ideas and accept new ones; be intellectually-open and accept the possibility of change; be frank in self or peer assessment; and to build healthy relationships. This study, bounded by the concept of collaborative learning, was designed to ensure that the necessary infrastructure was available. Competition can often hinder willingness to share information and work as a team, and so it was important to reduce competitiveness among the students. Competitive assignments were mainly replaced by activities based on promoting open sharing of individual work and encouraging peer feedback.

3.3.3 Assignments and Assessment

To promote reflection and information sharing, a set of tasks was developed and offered to students throughout the course. Initial tasks for creating personal profiles were intended to provide students with an opportunity to introduce themselves to each other and to share their personal and professional interests. These tasks were considered to be essential for creating a sense of community during the early stages of group formation (McConnell, 2006). The remaining assignments were mainly concerned with educational content, and were intended to promote online collaboration through peer-review activities and discussions. It was suggested to the students that they could share completed work and their learning experiences with the rest of the community, by uploading content to a personal or a common-file area or to a weblog.

4. Methodology, Data Analysis and Target Group

The adopted research methodology included both quantitative and qualitative analysis of the ways students interacted with the educational software. The study was conducted with four groups of undergraduate and graduate students from the school of Computing and Advanced Technologies. The data collection was based on various sources and was implemented in two stages. The first stage included a facilitation and observation of undergraduate students enrolled on the Web Development module from the first semester, while the second stage was focused on working with graduate students enrolled in the Research Methods module from the second semester [of the academic year??]. This paper mainly focuses on observations of the second stage, namely the teaching/learning experience of graduate students acquired during the second semester. Where applicable, the results are compared with data acquired from the first stage of the study.

The main difference between the two stages of the research was in the course design (CD). While student online participation and engagement with educational software was optional during the first stage, the second stage

required their participation for submitting course assignments. The detailed information on the subject groups is presented in the following table (Tab. 1):

Membership	***Number***	***Participation***	***Social Software Use***
- MSc (1 group):	11	Required	Tightly Integrated into CD
- HND (1 group):	14	Optional	Loosely Integrated into CD
- BSc (2 groups):	30	Optional	Loosely Integrated into CD
- Tutors:	3	-	-
- Observer:	1	-	-
- Administrator:	1	-	-
Participants Total:	60		

Table 1: Target groups and other participants involved in the use of educational software.

The data collection stage was tailored to allow analysis of student on-line behavior and to identify the patterns of engagement with the educational social software. The adopted research methodology was based on the following data collection techniques:

a) Recording students' posts, comments, level of personal customization, friend networks, use of RSS and tagging throughout the study period.
b) Recording students' critical feedback and suggestions received throughout the study period.
c) Collecting statistical data of accessing integrated educational software through a data recording plug-in. The data was used as additional evidence for triangulation with a third party web access tool.
d) Collecting statistical data through a third party Google Analytics web tool, namely recording frequencies of accessing integrated educational software systems throughout the study period.

The data analysis included:

a) Qualitative analysis of recorded posts, files and comments.
b) Quantitative analysis of statistical data, particularly student's access logs, collected from two different sources.
c) Considering student feedback and individual comments on integrated educational software for identifying patterns of using the systems.

4.1 Pedagogical and Technical Platform for the Research

Data for accessing both the VLE and the social software was monitored and logged. During the three-month period of observation of the Research Methods module a total of 3500 entries were recorded for accessing Elgg social software by the local logging mechanism. These records included each student's active participation, i.e. number of posts, comments, uploaded files etc., as well as passive participation, i.e. reading posts, downloading files, accessing other information etc.

The activities of participants (excluding the facilitator) in the Research Methods module generated a set of posts, comments and uploaded files. The summary of active participation records is presented in the following table (Tab. 2):

No.	***Activities***	***Details***
1.	71 total blog posts	30 blog posts restricted to community members only
		38 blog posts restricted to logged in users
		3 posts for public access
2.	78 Comments	-
3.	13 Files	8 files restricted to logged in users
		5 files restricted to community members only

Table 2: Records of participant's activities

Most of the content generated throughout the study constituted text-based posts and comments. No audio or video content was embedded by the participants. The analysis of the context of the posts and comments revealed that most of the generated content could be classified into the following categories:

- Discussion
- Self-Reflection
- Information Sharing
- Lurking (Observing)
- Peer Feedback and Review

The categorization has been based on a qualitative analysis of both personal and community blogs and is described in the following sections.

4.1.1 Discussion

The information exchange categorized as "Discussion" constitutes personal views, ideas, and questions and answers raised and covered by participants. Most of the discussions started during the course contained requests for help and feedback, or calls for information on a certain topic. The attributes of social software used throughout the study provided resources for starting discussions and conversations. Besides using personal blogs, participants could create/run communities on topics of their interest, and participate in discussions started in other communities and blogs. Users could also control access to certain information by setting access rights to their posts and other messages. The software allowed participants to see available communities and subscribe to receive email notifications for accessible posts.

The observations revealed that no community was started by participants during the study period. Most of the messages were posted on the community blog created by facilitators prior to students' registration and intended for conducting the module and its educational activities. However, some students willingly participated in discussions started in a public community, established by and intended for PhD students or requested membership to a closed community related to their subject of interest.

Also, and in contrast to general enquires that received comments from both facilitators and other students, most of the posts, which required some knowledge in the area of author's expertise, remained unanswered and do not develop into a discussion. The diversity of participants' area of expertise limited the number and quality of responses.

From the total of 149 messages only 39 were classified as related to a discussion thread. The average number of posts within a single discussion thread was 2.9. The average number of words within messages was 192. The length of the discussion posts varied significantly from a one line response to several paragraphs. As the participation in discussions was not integrated into the assessment scheme, we can assume that they developed naturally but not without encouragement from lecturers and facilitators. The longest discussion thread recorded contained 20 posts and had 5 participants involved.

It was found that most of the discussions evolved around the tasks and assignments required by the course. Students were mainly asking questions that related to their tasks, asking for help or calling for feedback from peers. It was observed that the longest and the most thorough discussion evolve shortly before the deadline for the first task of the assignment. This comprehensive task and the approaching deadline encouraged students to share their concerns and their views with the rest of the group.

4.1.2 Self-Reflection

Self-reflection upon learning and interaction of a learner with his/her peers and tutors is of major importance. It supports development of critical thinking, promotes creativity (Tiwari & Tang 2003) and meaningful learning, and most importantly deep understanding (Carraccio & Englander 2004; Pinsky & Fryer-Edwards 2004; Abrami & Barrett 2005). However, according to McMullan, students can be reluctant to engage in self-reflection activities for being frightened to write about personal weaknesses as well as strengths (McMullan 2006).

Despite the fact that the system recorded 47 messages posted on personal blogs, the number of self-reflective messages was quite low. Only two students posted 4 reflective notes, in response to facilitators' call for sharing their thoughts on their progress. These messages shared their concerns and problems with personal progress and understanding of the subject knowledge. Although students were provided with the tools for self-reflection and opportunity for exchanging personal experience, the course design did not reward students for sharing their

reflective thoughts and ideas. A revision of course design may be necessary for extending the level of self-reflective activities.

4.1.3 Information Sharing

Messages classified under the category of "Information Sharing" contained mainly external information such as research papers, articles and links to resources related to the context of the course or participants research area. In contrast to the level of participation in discussions, the extent of information sharing was significantly low. Sharing of external resources was identified in seven posts.

Unfortunately, the messages containing external data were commented neither by peer students nor by lecturers or facilitators. Due to variations in participants' interests, the information shared on the system had limited value for the rest of the community. There was not any pattern identified for sharing information, as the posts are distributed throughout the course without evidence of relationship to a particular educational activity or course design.

4.1.4 Lurking (Observing)

The dictionary of Internet and Computing defines lurking as the "process of reading the postings without initiating any" (2001). The level of lurkers' participation and contribution to discussions is usually low if any. It is not usually easy to identify what drives the behavior of remaining on the periphery of a course activity such as this. Some of the reasons could relate to personal learning characteristics or lack of technical skills. However, many argue that learning, even in this more passive and less visible mode, is still occurring and is still an important activity for learning (Fritsch 1999; Beaudoin 2002).

Logging students' online behavior throughout the course allowed us to shed light on the rationale behind students' actions. The system recorded both the actions participants took and the timeline of their online behavior. The list of records include mostly actions which otherwise would remain invisible, such as reading posts, editing messages, downloading files, accessing community profiles etc. From the recorded 3500 actions the most popular action is related to accessing user profiles and weblog posts and comments. The following table (Tab. 3) presents accessed modules, actions and frequencies of access.

No.	***Module***	***Action***	***Frequency***
1.	Weblog	View Post	**612**
2.		Edit Post	36
3.		Add Comment	87
4.		Add Post	77
5.	Profile	Update	12
6.		View	**675**
7.	Files	Delete File	2
8.		Upload File	15
9.		Create Folder	7
10.		Download File	**134**
11.		Access File list	227
12.	Friends	See All Friends	**188**
13.		Request Friendship	2
14.		Add as Friend	11

Table 3: The frequency of lurking

Although we witnessed students' lurking throughout the course, the level of engagement with the social software varied. The number of records for accessing weblog posts increased by 53% after the second half of the course. There was a major difference in course design between the two parts of the course. While the first part encouraged students to participate in discussions and use social software at their discretion, the second half of the course contained peer assessment tasks that required participants to submit their course-work via social software and

to provide feedback to at least two of their classmates. This task encouraged students to go through others' posts more frequently than usual.

4.1.5 Peer Feedback and Review

Throughout the study students were encouraged to share their research proposals and ask for feedback, as well as share their opinion on the work of classmates. The posts and comments containing reflective thoughts and suggestions intended for colleagues were classified into the category of "Peer Feedback and Review". The ratio of posts and comments in this category was significantly higher than the number of messages classified as self-reflection or information sharing. We identified 45 messages in total related to asking/providing feedback on student proposals. However, the great majority of these messages – 30 posts and comments – were published during the second half of the course. They were driven by the requirement to submit a course assignment by means of the social software.

The assignment, which was designed to be a part of the assessment, required each student to design a pilot study and report the results by posting them on their personal blogs. Later on, each student was asked to provide feedback on the work of at least two students by posting a comment evaluating his/her colleague's pilot study.

The observation showed that, despite repeated efforts to encourage students to provide feedback to their peers, the majority of students remained reluctant to review colleagues' work. Within the first half of the study 9 posts were added containing a proposal or a description of students' preliminary projects and calls for peer review. However, only 6 comments related to 3 proposals were added as a constructive feedback containing a critical evaluation of peers' work. At the same time, the critical evaluation was not deep enough and lacked analytical details behind the rationale of provided feedback. The rest of the posts, 6 in number, remained unanswered. The situation changed when the peer review was made to be part of the assignment and assessment process. The number of posts related to peer review increased by 200% by the end of the term, and the quality of the feedback improved as well. Students were evaluating colleagues work to a greater depth and with a more thorough analysis than during the first part of the course. Based of this observation we can assume that the feedback received from peers will be shallow in analysis and will rarely be initiated by peers unless demanded by the course design.

4.2 Course Design and Social Software Access Timeline

The use of the third party tool Google Analytics provided us with an opportunity to triangulate the data acquired through the local logging mechanism and to analyze the timeline of accesses to the social software and map it to the course design. The records show that the number of visits increased by 35% and the number of page views increased by 66% after March 23rd. Although these results can be affected by the growing amount of data published by students, it is clear that the peaking points of accessing the software coincide with the deadlines for submitting the course assignments – April 10th and April 23rd (Fig. 1).

Figure 1: Social Software Access Timeline

4.3 VLE Versus Social Software

Despite the fact that students were provided with two conceptually different e-learning platforms, Moodle VLE and Elgg Social Software, the acquired data shows that throughout the Research Methods module the social software was significantly more popular than Moodle. It was found that Elgg was accessed 5.8 times more frequently than Moodle. This contrasts with records taken during the first part of the pilot study which focused on work with undergraduate students on the Web Development course, when students were using Moodle 4.6 times more often than Elgg.

Major changes were introduced in the second semester that explain this difference in student engagement with the technology. In order to observe the natural uptake of engagement with social software, it was made optional for students to collaborate, share their work and provide feedback by means of social software. In contrast, during the second semester the use of social software was closely integrated into the course design, for the purpose of discussing ideas, sharing experience and most importantly submitting assignments. We can conclude from this experience that integrating the educational tools into the course design will significantly increase student engagement with educational technology. The figure below (Fig. 2) presents the use of e-learning platforms used throughout the study.

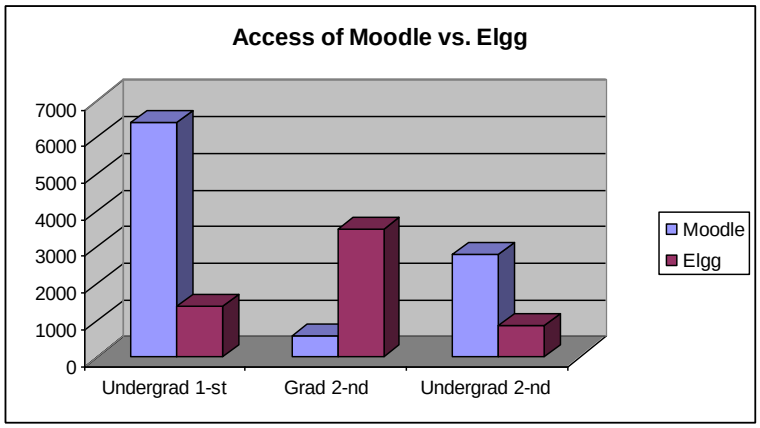

Figure 2: Use of e-learning platforms used throughout the study.

5. Research Restrictions

In contrast to Moodle, Elgg social software has a shorter development history. As a result the specifications of the two technologies are not always easily comparable. The records of independent comments received from students revealed that most students were disappointed with the usability of Elgg. Additionally, Elgg has relatively limited functionality for managing users and monitoring their actions. It is therefore possible that the level of engagement with the social software environment might have been affected by the limitations of Elgg's technical specification.

As recorded earlier, the study is limited to considering only students enrolled in the school of Computing and Advanced Technologies and to a relatively small group of subjects, which prevents us from making a generalization based on the current study. The results must therefore be treated with caution.

6. Conclusions and Future Research

The results of the study suggest that the level of engagement with social software can be affected by how closely the software is integrated into the course design. In particular: [1] greater depth of discussions and higher quality of peer review activities can be expected; [2] deviation from previously observed level of student engagement with VLE and social software can be observed.

Further research directions suggested by this study include:

[1] it is important to understand why students remained reluctant to engage in some online activities. The level of prior experience with social software is one possible factor. However, it may also be due to participants' level of English skills and their level of comfort with working with textual material.

[2] given variations in engagement with VLE and social software, there is a requirement for a more detailed understanding of patterns of use of educational software, thereby ensuring that effective teaching practices are adopted for these technologies appropriate for all styles of engagement and learning.

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