Distance learning – Social software's killer ap?

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This paper discusses the challenges of developing modes of distance education that afford maximum freedom for learners—including the ability to enroll continuously and to pace one's own learning—and yet still create opportunities to work cooperatively in learning communities with other students. To resolve these often conflicting priorities, a new genre of networked-based learning tools known as educational social software is defined, described and its attributes discussed. The paper concludes with a description of the design-based research work begun at Athabasca University using an instance of the ELGG open source, social software tool set.

In this paper I overview the critical role of interaction and social presence in all forms of formal education, including those delivered at a distance. I then discuss definitions and features of a new genre of web-based tools known as educational social software. These tools have application for both on campus and off campus educational provision, but my focus is on distance education and specific use in self-paced, continuous enrolment courses. Finally, I briefly discuss the Open Source social software tool, ELGG, and our plans for deploying it with both cohort-based and self-paced continuous enrolment courses at Athabasca University – Canada's Open University.

Social challenges in distance education

The integration of information and especially communications technologies into distance education programming has significantly altered both the processes and the content of much of this programming. Nonetheless, distance education, and especially those forms that maximize individual freedom by allowing continuous enrolment and individual pacing, is often perceived and experienced as a lonely way to learn. It is likely that the implicit requirement for self motivation reduces accessibility to many students who have little exposure to, or sufficient experience with, programming that is not structured and orchestrated by a live (and often face-to-face) teacher. This challenge — to permit maximum student freedom, while supporting opportunity for community building and mutual individual support in cost effective ways — is perhaps the greatest challenge (and opportunity) facing the distance education community.

Many programs attempt to meet these challenges by developing models of learning based upon cohort groups of students, interacting most often asynchronously through text conferencing with a teacher and other students. However, this model has not been demonstrated to be cost effective (Annand, 1999; Rumble, 2004; Fielden, 2002). Few published accounts of such cohort-based programming support more than thirty students per teacher in a class and a very frequent outcome is that teachers find such models of delivery require more time expenditure than equivalent classes delivered on campus (Jones & Johnson-Yale, 2005; Lazarus, 2003).

Much of the high cost of such programming is related to time requirements placed upon instructors to interact with students. Although I have argued elsewhere (Anderson, 2003) that student teacher interaction can be substituted by student-student and student-content interaction,

it is not easy to orchestrate and support such interactions, and both traditionally minded students and teachers easily slip into cost ineffective models of e-learning. A recent study of e-learning programs (Ramage, 2005) offered by twelve US colleges concludes that all but two of these are cost inefficient and again highlights the need to gain economy of scale or change the nature of the instructional processes to create cost effective e-learning.

Before arguing for the capacity of new social software tools to alleviate these concerns, I briefly overview theoretical models that highlight social presence and interaction issues in distance education programming.

Social presence

Randy Garrison and I worked to develop a model of e-learning that we refer to as the *Community of Inquiry* model. Figure 1 revisits this model.

Figure 1: Community of Inquiry, from Garrison, Anderson, and Archer (2000)

Note the pivotal role of social presence in not only setting the educational climate but also in supporting discourse and creating the educational experience. We defined social presence as 'the ability of learners to project themselves socially and affectively into a community of inquiry' (Rourke, Anderson, Archer, & Garrison, 1999). We spent some time developing tools to measure social presence in asynchronous text conferencing systems and validating these tools via interviews and surveys (Rourke & Anderson, 2002). This work has been extended and quantified by a number of researchers (Tu, 2002; Stacey, 2002) demonstrating amongst other findings that social presence is correlated with student satisfaction and higher scores on learning outcomes (Richardson & Swan, 2003).

Although the key variable of interaction is critical in all three of the presences, it is perhaps most important in the development and support of participants' sense of social presence. Assuming that interaction is necessary to develop social presence leaves us the question of which forms of interaction and amongst which partners is the interaction most critical and most cost and learning effective?

Learner freedom and social presence

Beyond access to content, perhaps the greatest benefit to both formal and lifelong learners afforded by the Net is the freedom to control one's learning experience in a number of dimensions. Paulsen (1993) modelled these forces in a 'theory of cooperative freedom' in which six different dimensions of freedom are described. These include the familiar freedom of space and freedom of time that have defined much traditional distance education programming. But he also describes the freedom to pace one's learning in response to individual competencies or time availability. A fourth dimension concerns the freedom of media that allows choice of learning medium to match a host of media access and usability constraints and communication system qualities and preferences. Fifth, is the freedom of access that includes removal of barriers of prerequisites and high costs. Finally, Paulsen's sixth dimension is freedom of content that allows the learner to have control over the subject and instructional style of their learning. I have suggested to Paulsen the need for a seventh freedom: that of freedom of relationship, where learners are allowed to engage in the type of learning relationship with other learners that best fits their individual social needs and capacities.

Paulsen argues that individual learners are more or less concerned with each of these dimensions of freedom and are interested in learning designs and activities that meet their individual freedom preferences and constraints in each dimension. Further, these dimensions are not stable, but shift in response to individual and group preferences, constraints, and opportunities. Traditional campus-based programming developed in the form it has today because it evolved within times of very severe personal constraints imposed in each of these dimensions. For example, the first universities offered classes centered on rare volumes of text found in medieval libraries. Later school schedules were designed to allow students to work on their parents' farms in summer months. As these constraints are reduced by technical and social innovation, opportunity and demand are created for the development of much freer learning opportunities that are evolving to co-exist with traditional campus bound educational programming (Friesen & Anderson, 2004). Recent interest in so called blended learning (Bersin, 2004; Garrison & Kanuka, 2004) shows that it very possible to combine different formats and media of delivery. However, the challenge is to select and to invent those forms of education that offer the greatest degrees of freedom and yet retain high levels of cost and learning effectiveness.

Social software

The term 'social software' is often attributed to the writing and promotion of Clay Shirky who defined it as 'software that supports group interaction' (Wikipedia, 2005). This definition is so broad that it includes everything from email to Short Message System (SMS), thus it has been qualified by a number of authors. Allen (2004) notes the evolution of software tools as the Net gains in capacity to support human interaction, decision making, planning and other higher level activities across boundaries of time and space and less adeptly those of culture and language. Levin (2004) builds on Allen's historical description by noting how much the technology has defined the field and how that technology has radically changed and improved since earlier generations of software that were designed to connect and support human communications. Similar to Anderson's (2004) affordances of the semantic web, Levin notes the ubiquity of the Net and especially the 'findability' of content afforded by even current generations of brute force searching with tools like Google. Second, she notes the pervasive and multiple formats of communication supported, ranging from synchronous to asynchronous: from one to one, to many to many, from text to full multimedia, from communications in a dedicated home theatre to that supported on a mobile phone while in transit. Finally, Levin notes the affordance of the Web to support new patterns of interconnection that 'facilitate new social patterns: multi-scale social spaces, conversation discovery and group forming, personal and social decoration and

collaborative folk art.' Lefever (2003, blog entry, http://www.leelefever.com/archives/000143.html) makes a distinction between interaction between humans and machines and that between other users. He writes 'where normal software links people to the inner workings of a computer or network, social software links people to the inner workings of each other's thoughts, feelings and opinions.' Coates (2002) provides functional characteristics of social software to extend human communications capabilities. Coates describes the enhanced communications capacity provided by social software over time and distance (the traditional challenges of access addressed by distance education). He goes on to note that social software adds tools to help us deal with the complexities and scale of online context such as filtering, spam control, recommendation and social authentication systems. Finally he argues that social software supports the efficacy of social interaction by alleviating challenges of group functioning such as decision making, maintaining group memory, documenting processes, etc. Butterfield (2003) is much broader in his discussion of the qualities of social software. He characterizes social software as tools that support communication using the five 'devices' of identity, presence, relationships, conversations and groups.

Cervini (2003) also notes the capacity of social software to perform directed searches for specific people or those with specific interests or skills in complex social networks. She argues that 'without the ability to execute directed searches, through a social network, the transition cost of finding other users within the system is simply too high to warrant using the system' (p.2). Obviously in educational systems characterized by high degrees of freedom, it becomes much more difficult to find fellow students and initiate and develop supportive learning interactions.

Just as the definition of social software defies precise definition, the classification and categorization of social software tools is also evolving. Judith Meskell maintains a social software meta-list (http://socialsoftware.weblogsinc.com/entry/9817137581524458) in which she categorizes 380 (September, 2005) links to social software applications. Her taxonomy classifies these tools into categories of business, common interest, dating, face-to-face meeting facilitation, friend, MoSoSo (Mobile Social Software), pets, photos and a new one titled 'edge cases'.

One can see both common threads and divergences in the definition and classification of this new genre of tools. Meskell's listing does not yet provide a list of educational social software sites nor have I found any precise definition of social software in the literature, so I have coined my own! (Anderson, in press). I have tried to combine the sense of freedoms from Paulsen's categories to define educational social software as networked tools that support and encourage individuals to learn together while retaining individual control over their time, space, presence, activity, identity and relationship. Obviously popular educational tools such as computer conferencing and email qualify as social software under this definition. However, these and other common communication tools are primitive examples of a variety of services that distributed networked learners require and that are currently under development.

In summary, a concise and precise definition of social software seems to yet elude us, but it is clear that the problems that social software addresses (meeting, building community, providing mentoring and personal learning assistance, working collaboratively on projects or problems, reducing communication errors and supporting complex group functions) have application to education use, and especially to those models that maximize individual freedom by allowing self pacing and continuous enrolment. Educational social software (ESS) may also be used to expand, rather than constrain freedoms of their users. In the next section, I turn to requirements and examples of educational social software.

Features of educational social software (ESS) applications

In this section, I overview functions and features of social software that can be used to enhance distance education processes. The details below are condensed and updated from those presented in an earlier book chapter (Anderson, in press).

Presence tools

ESS tools should allow learners to make known (or conceal) their presence both synchronously and asynchronously. An example of presence notification was provided in my early experience with computer conferencing software. The first full course I taught used the First Class system and notified learners when other members of their cohort were currently online. This notification allowed one to see and communicate (by an instant text message) with other students. Students could then agree to meet in the chat room for more sustained and perhaps larger group, real time interaction. When I changed education institutions, I began teaching with WebCT that lacked this notification of presence, and I found that the built in chat rooms were almost never used and certainly not in a spontaneous fashion. Hanging out in an empty chat room waiting for someone to drop by is not an engaging activity!

This sense of presence can also operate to support presence in physical space, as provided by tools for mobile social networking or in the capacity to help identify those in social proximity who share a common interest in educational or discipline related interest. Of course, this sense of presence must be under the control of the individual learner since there are times when I welcome presence of other ‘kindred souls’, while there are other times when I need the freedom to protect and maintain my privacy and anonymity.

Notification

Contributing to a learning community and not receiving feedback or acknowledgment of that contribution quickly discourages and tends to extinguish further participation. Good ESS provides both pushed and pulled form of notification. Using push tools such as RSS, instant messaging, or even email can be used to provide notification to the learner when new content or communication is entered into a learning space. Quality ESS tools will allow historical and persistent display and searching of these interventions so that the learning space can be searchable and span across significant lengths of time.

Filtering

The assault on our systems caused by both legitimate avalanches of potentially useful information as well as the non-legitimate spam creates need for ESS to contain collaborative filtering systems. These systems need to be able to filter out illegitimate information as well as filter in items of potential interest. Filtering out is being handled with various degrees of success by many of the commercial spam filters. But being able to filter in relevant information is a greater challenge. Downes (2005) discusses the use and limitations of various semantic web tools such as RSS and FOAF to create and maintain critical dimensions of identity. The solutions (like most other semantic web applications) seem inviting and even plausible, but many have noted the slow emergence of relevant and effective semantic web applications.

Cooperative learning support

Paulsen (2003) makes a distinction between cooperative learning activities in which learners are encouraged (though not required) to cooperate in learning activities that are alluring to the individual learner, and collaborative activities where members are compelled to work together through the duration of an activity. This distinction between collaboration and cooperation based upon compulsion to interact is unique and fits well with ESS programming. Cooperative activities are generally short term, bounded in temporal space (for example a week project), often not time centric, such that learners can cooperate outside of the knowledge of where and in which order they are studying and can consist of cooperation between those engaged in the class and that

larger group of family, friends (virtual and face-to-face) and colleagues not formally enrolled in a program of studies.

Referring

Humans and other social animals tend to flock to activities in which others are engaged. ESS tools track activities in which students engage, noting indicators of success (time spent, assessments attempted and past, formal evaluations, etc.). These referrals can be used by students to select learning activities and courses and by teachers and administrators to evaluate, refine, and continuously improve the learning activities. Koper (2005; 2004) has developed interesting models of implicit referral systems in which students' activities leave trails much like the pheromone trails left by ants to guide other members of the colony to food sources. His simulations of these models show how individual student experiences can be used to improve learning networks and provide useful referral services to new students.

Student modelling

Much of the previous functionality depends upon or is enhanced when it is possible to identify, classify, and quantify the individual profiles of learners. Such systems might capture interests, learning styles, goals and aspirations, accomplishments, and progress through a course of studies, personal characteristics such as professional interest and experience, family status, and other individual and group information (Towle & Halme, 2005). These profiles can then be used by ESS software to customize referrals, notification, filters, etc. There is considerable work being done in this area by members of the artificial intelligence in education (see for example Shute & Towle, 2003). Some systems usually produce a static XML-based learner profile that is explicitly altered by the learner. Others (McCalla, 2004) use more active techniques where the learner profile is being updated in real time by activities, assessments, and interactions between the learner and other learners, teachers, and content. These systems are all migrating to exposure in XML that can be read and interpreted by both humans and autonomous agents. Various standards bodies including the IMS (see http://www.imsglobal.org/profiles/) are working to create standardised schemas for formally defining learner profiles in such a way as they can be read and interpreted as components of the Educational Semantic Web. It is worth emphasising that learner profiles must be under ultimate control of the learner if critical issues of trust and privacy are to be maintained in ESS systems.

Stephen Downes (2005) has argued that we need to link resources with the humans who have built, used, recommended, or otherwise commented upon them. This 'explicit conjunction of personal information and resource information within the context of a single distributed search system will facilitate much more fine-grained searches than either system considered separately'..This takes learner profiles beyond their instantiation as means to modify content to allow systems whereby learners can meet with and engage with others based upon their individual experience of learning activities and outcomes.

Introducing learners to each other

Some of the most successful commercial social software (note especially the business and dating tools classified by Meskell) are based upon providing selective referrals to other persons for social or commercial motivations and effectual encounters. Most of these referral systems are based on an assumption that those people whom you regard as friends are more likely to be become friends of each other than a random selection of individuals. Thus, mining both these weak and strong connections allows us to become acquainted and possibly work or learn together with others with a greater probability of profitable exchanges developing. This can provide distance learners with the well known capacity of campus-based education systems to serve as meeting places for diverse individuals from many groups, as well as for developing

stronger links to those sharing common cultural identities. Thus, ESS tools can serve distance learners as environments in which learners are free to share their interests, connections, communities, and friends. It is also worth noting that ESS tools facilitate the development and sharing of reputation since documented postings and interactions can be used as referencing trails by which one can determine the past contribution of learners to other learners or the learning community more broadly.

Helping others

The study group has long been a feature of campus-based learning systems. Developing these groups in virtual and independent study contexts is challenging. Very interesting work has taken place at the University of Saskatchewan in the development of the I-Help system (Greer, McCalla, Vassileva, Deters, Bull, et al., 2001). The I-Help system configures an autonomous agent for each student that knows its owner's skills, preferences, and fiscal capacity (in real of play money) to provide and request help from other students. When a student requires help they can release their agent into the learning space and negotiate with the agent of another, more skilled learner. These negotiations may lead to a request for help by email or telephone and subsequent exchange of funds and evaluation by both the helper and the helped. Of course, this help can also be used for activities that violate academic standards and morals such as cheating and plagiarism. In my own institution, providing our independent students with capability to meet each other has raised some faculty concerns with the increased possibility and efficacy of such activities and threats to our on-demand and continuous exam system that seems to be based upon an assumption that students are not in contact with each other. These concerns are also a concern for campus-based systems and technical and social fixes have been developed to, at least partially, constrain these opportunities. More importantly, ESS will force us to develop competency type examinations that build upon and exploit social learning, rather than attempt to eliminate it.

Documenting and sharing of constructed objects

Much formal learning is based on students' learning and re-learning a very slowly evolving body of knowledge. Educational strategies designed for such contexts are not highly productive in contexts in which useful information and knowledge is under continuous revision. More currently, educational authors (Grabinger & Dunlap, 2002; Collis & Moonen,2001) have argued that students should be actively creating rather than consuming knowledge. Our own experiences of assigning students the tasks of creating learning portals and learning objects for each other have been very positive (Anderson & Wark, 2004). But often the co-creation of content has assumed that students are actively working and designing learning content in synchronous fashion. ESS tools will need to support students working continuously to update content started months or even years previously by other students. WIKIS and collaborative blogs are first generation tools to support this type of interaction. However, more sophisticated tools capable of including multimedia, tracking both contribution and learner use, controlling access to creation tools and assessing learning outcomes are needed.

From the generic potential functionality, this paper now moves to specific description of available ESS tools, focusing on those that are Open Source and available. In particular, I overview our initial design-based study using the Elgg system developed by David Tosh and his colleagues at the University of Edinburgh.

Current educational social software tools

Many of the 380 social software tools categorized by Meskill can be used for educational application. However, many are proprietary offerings providing a service, but not distributing the

software itself. Such solutions may be useful for individual student exploration, and small class work, but do not allow freedom to design and create value added instances of ESS that are customized for particular groups of learners.

Generally ESS tools that have been developed to date offer combinations of blogging, portfolio management, discussion and file sharing, group file management, and search and linking capacity. Due to ideological issues, low budgets and our desire to have control, our search for a development platform for our use was confined to those offered as Open Source products. In our search, we found a number of generic database/content management tools (notably Plone http://plone.org and Drupal http://drupal.org/) that could be developed as ESS applications. However, the programming and customization work would be considerable. Fortunately, we were able to discover two OS tools that were already focused on ESS use. BarnRaiser offers an interesting program based known as the Aroundme platform. The current version 0.43 offers the usual blogging, polls, group tasks, and a very interesting tool to measure the 'social capital' of contributors. The second tool, ELGG (version 0.30), offers many of the same tools and was chosen for our installation due to the strength of its ad hoc folksonomie style linkages, the number of active users on the main elgg.net site, and a Canadian connection (David Tosh - one of the principal developers is a Canadian with whom we have developed a long distance friendship and is friend of a number of our friends – how social!)

An instance of ELGG was installed at Athabasca (with minimal problems) and rechristened me2u.athabascau.ca (figure 2)

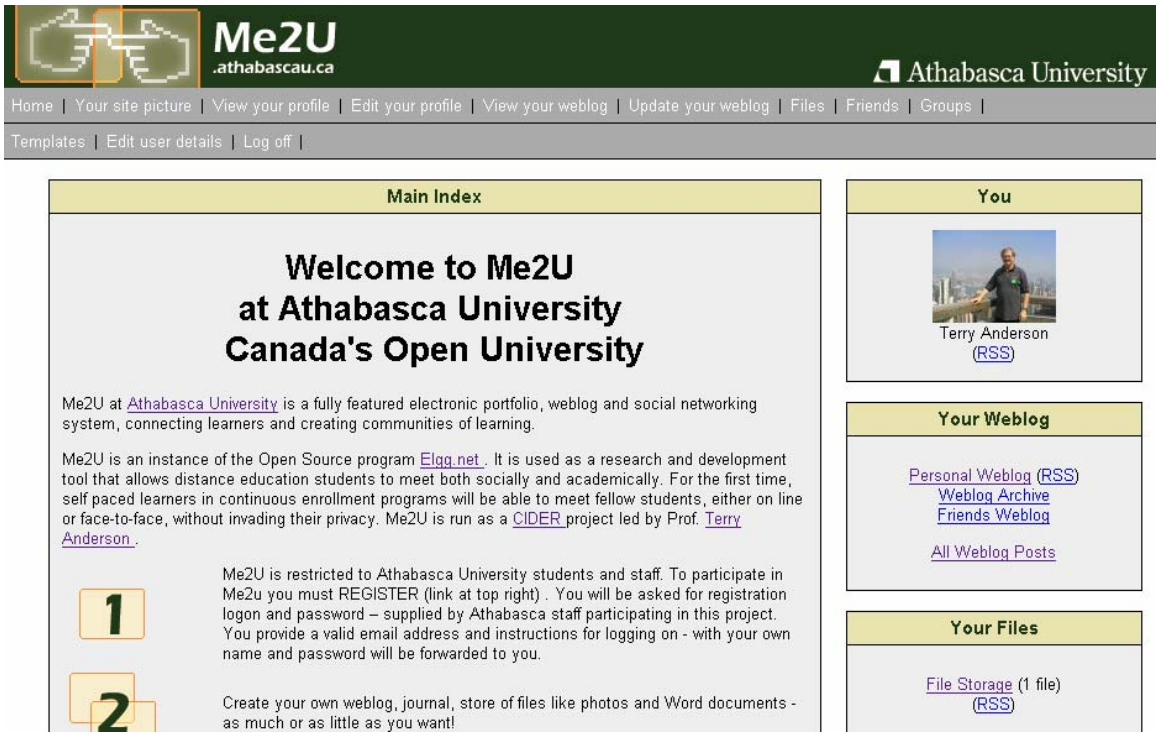

Figure 2: Me2U.athabascau.ca

We were interested in testing an ESS application within a particular education program, and thus have chosen the route of creating a resource that is exclusive to students registered at our institution. Downes (2005) and others have argued that such silos are inherently restrictive, but they offer a safer, more controlled environment for educational testing. Naturally, these

environments should support RSS and other notification tools such that learners are not expected to spend a great deal of time waiting for action on their institutional ESS installation.

The final section of this paper describes our research design used to assess this intervention.

Design-based development of Me2U

Bannan-Ritland (2003) describes four stages of design-based research and maps these to more traditional forms of education research and publication. The first stage is one of informed exploration. Our earlier 2004 survey of student experience of interactive interventions and consultations with global distance educators (Anderson, Annand & Wark, 2005) has set the stage for, and detailed the need for, social software solutions. Our primary focus is on students enrolled in unpaced and continuous enrolment courses. We hope to design an informal place for development of social presence and tools to allow students to engage in voluntary, for credit, learning activities that contain cooperative learning components. Through engagement in these learning activities as well as through profiling services allowing them to connect online or in person with other students, we hope to allow them to form relationships with other learners in loosely structured learning communities. We also continue to track innovations in social software and develop conceptual models for their effective adoption in formal learning educational contexts.

In the second stage of development, we have installed the ELGG tools and are developing support documentation and systems to facilitate its use in pilot applications. We will plan to work with our colleagues at Norwegian Knowledge Institute in Norway (Morten Paulsen) to develop an optional student profile system that encourages learners to develop and share their individual learning plans. Finally, development in this phase includes adoption and development of new learning designs that create compelling, but optional, learning activities that support the learning community while retaining student freedoms.

In the third phase, our educational social software interventions are piloted in one of more local contexts. We will work with designers, program and course managers and faculty in a selected number of academic departments at Athabasca University. Our approach will move towards a grounded theory model in which we will use a variety of data sources (interviews, observations, final exam scores, completion rate data, student perceptions of learning, cost accounting, machine log analysis, and transcript analysis) to develop and test a grounded theory of educational social software use in learner paced e-learning.

The fourth phase of a design based research project focuses on understanding the innovation's effect in multiple contexts. Working with national and international partners, we will provide the tools and techniques developed and tested in Phase 2 and 3 in a wider variety of contexts. The evaluation tools that proved most useful in pilot testing and development in Phase 3 will be refined and used to gather data across these diverse sites. The theory that has emerged in Phase 3 will be validated, tested, and refined in this phase. We will use the community and repository tools developed at the Canadian Institute for Distance Education Research (http://cider.athabascau.ca) to build and support a community of researchers and practitioners in their own implementations of ESS tools and theory developed in earlier phases of the research.

Conclusion

This overview of ESS tools is perhaps yet another instance of 'it will be perfect when. . . '. ESS tool development and application is in very early stages and doubtless there are many blind alleys as well as very productive avenues yet to explore. I remain convinced that using the tools and affordance of the emerging educational semantic web will result in very significant improvements (both in cost and learning effectiveness) to our current practice and theory of distance education. Social software needs a 'killer ap' and distance education needs new cost

and learning effective tools to develop and enhance the creation and maintenance of social presence. These are indeed exciting times!

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