Social Software to Support Distance Education Learners

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INTRODUCTION

This chapter 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 and advantages to working 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 (ESS), is defined, described, and its attributes discussed. These tools have applications for both on-campus and blended-learning applications, but my focus is on distance education – specifically, their 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.

SOCIAL CHALLENGES IN DISTANCE AND ONLINE EDUCATION

The integration of information technologies, and especially of communications technologies, into distance education programming has significantly altered both the processes and the content of much of this programming. Nonetheless, distance education, 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 opportunities 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 of isolation and self-direction by developing models of learning based upon cohort groups of students, interacting either through real-time audio, video or immersive conferencing, or asynchronously through text conferencing with a teacher and other students. However, this model has not been demonstrated to be cost-effective (Annand, 1999; Fielden, 2002) when compared to self-paced distance learning (Rumble, 2004). Few published accounts of such cohort-based programming support more than 30 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 the 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 2005 study of e-learning programs (Ramage, 2005) offered by 12 U.S. colleges concludes that all but two of these are cost-inefficient and again highlights the need to create cost effective e-learning by gaining economy of scale or changing the nature of the instructional processes. 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.

Note the pivotal role of social presence, not only in setting the educational climate but in supporting discourse and creating the educational experience. We define 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

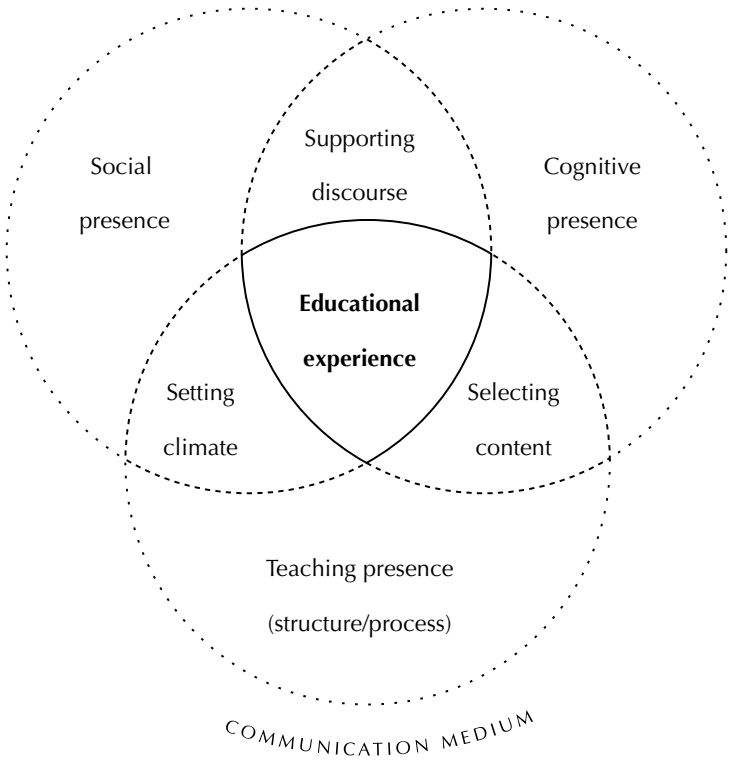

Figure 1. Community of Inquiry model from Garrison, Anderson, and Archer (2000)

developing tools to measure social presence in asynchronous text-conferencing systems and validating these tools via interviews and surveys (Rourke & Anderson, 2002; Arbaugh, 2007). This work has been extended and quantified by a number of researchers (Tu, 2002; Stacey, 2002), demonstrating amongst other findings that social presence correlates with student satisfaction and higher scores on learning outcomes (Richardson & Swan, 2003).

Although the key variable, interaction, is critical in all three of the presences, it is perhaps most important in the development and support of the participants' sense of social presence. Assuming that interaction is necessary to develop social presence leaves us with the questions: which forms of interaction are most critical, 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) models 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, as well as communication system qualities and preferences. Fifth is the freedom of access that includes removal of the barriers of prerequisites and high costs. Finally, Paulsen's sixth dimension, freedom of content, 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 dimension, 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 into the form it takes today because it evolved in times of very severe personal constraints imposed in each of these dimensions. For example, the first universities offered classes centered around 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 blended learning (Bersin, 2004; Garrison & Kanuka, 2004) shows that it is very possible to combine different formats and media of delivery. However, the challenge is to select and 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 (2003), who defined it as "software that supports group interaction". This definition is so broad that it includes everything from email to Short Message System (SMS), so it has been qualified by a number of authors. Allen (2004) notes the evolution of software tools as the Net gains in its 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 the 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."

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, and so on. 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 for 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 social software defies precise definition, the classification and categorization of social software tools is also evolving. Stutzman (2007) makes an interesting distinction between social software tools and suites that are focused upon objects (object-centric) and upon people (ego-centric). Object-centric sites allow users to share, comment upon, and display a wide range of digital media, such as photos, music, books owned or read, citations, or music recordings. Ego-centric sites usually contain profiles, personal diary spaces (blogs), lists of friends, community discussions, and other tools that allow users to locate, work, and play with each other. Jon Dron and I (Dron & Anderson, 2007) have also been classifying the functions of social software into the tools that support groups, that support networks, and that support collectives or aggregated users.

Social software shares some of the defining features of what Tim O'Reilly first referred to as Web 2.0 tools. O'Reilly (2005) defines Web 2.0 as

> the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of Web 1.0 to deliver rich user experiences.

Many social software tools are network-centric, and most get better as more people use them, creating network effects and building on an "architecture of participation." However, social software predates Web 2.0, and it focuses more on supporting the social relationships than the more technical and network-intensive applications referred to as Web 2.0. To summarize, many of the newer social software tools can also be described as Web 2.0 tools, but not all Web 2.0 tools are focused on meeting social needs.

One can see both common threads and divergences in the definition and classification of this relatively new genre of tools. Social software tools can be applied to many tasks and in many domains. A few social software tools have been developed with explicit educational goals; however, most are general purpose tools that can be used by individuals, groups, or networks of users, either as a component, support, or not associated at all with formal education.

Since there no single definition of social software has evolved in the literature, and none specifically related to education applications – I have coined my own (Anderson, 2006a)! 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 tools, services, and support that distributed networked learners require.

In summary, a concise and precise definition of social software still seems to elude us, but it is clear that the problems 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) apply to educational 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, the freedoms of their users. In the next section, I turn to the requirements of educational social software, with examples.

FEATURES OF EDUCATIONAL SOCIAL SOFTWARE (ESS) APPLICATIONS

In this section, I overview functions and features of social software that are can be used be used to enhance distance education processes. The details below are condensed and updated from those presented in an earlier book chapter (Anderson, 2006a).

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 educational institutions, I began teaching with WebCT, which 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!

Presence notification can also operate to support presence in physical space, as provided by the tools for mobile social networking, or for helping to identify those in social proximity who share a common interest in an educational- or discipline-related interest. Presence indicators are also being added to text, audio, and video communication and conferencing tools to allow us to see which of our friends or colleagues are available for instant answers, feedback, and interaction. Of course, this sense of presence must be under the control of the individual learner; there are times when I welcome the 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 forms of notification. Using push tools such as RSS, instant messaging, or even email provides notification to the learner when new content or communication is entered into a learning space. Quality ESS tools also 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 non-legitimate spam, creates the need for ESS to contain collaborative filtering systems. These systems need to be able to filter out illegitimate information, as well as filtering in items of potential interest. Filtering out is being handled with various degrees of success by many of the commercial spam filters. But filtering 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 the 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-long project), and often not time-centric, such that learners can cooperate outside of the knowledge of where and in which order they are studying, and can cooperate with both 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. Colleagues at the Dutch Open University (Kester et al., 2007) have been supporting the emergence of "ad hoc transient communities" of self-paced learners in which cooperative activities, cooperative problem solving, and team-teaching activities are designed.

Referring

Humans and other social animals tend to flock to activities in which others are engaged. ESS tools track activities which students engage in, noting indicators of success (time spent, assessments attempted and past, formal evaluations, and so on). 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 (2005b; 2005a) 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. Dron (2007; 2004) has expanded this further and defines such *stigmergic* activities as one of ten design features of effective social software.

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, and so on. Considerable work is being done in this area by scholars working in the field of artificial intelligence in education (see, for example, Boticario, Santos, & Rosmalen, 2005; Shute & Towle, 2003). Such systems usually produce an XML-based learner profile that is explicitly altered by the learner. Others (McCalla, 2004) use more active techniques, where the learner profile is 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 standardized schemas for formally defining learner profiles in such as way that they can be read and interpreted as components of the Educational Semantic Web (Anderson & Whitelock, 2004). It is worth emphasizing that learner profiles must be under the ultimate control of the learner if critical issues of trust and privacy are to be maintained in ESS systems.

Stephen Downes (2005) argues 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 step would take learner profiles beyond their instantiation as a means to modify content, and to allow systems where learners can meet with and engage with others based on their individual experience of learning activities and outcomes.

Introducing Learners to Each Other

Some of the most successful commercial social software (for example, LinkedIN and Facebook) are based upon providing selective referrals to other persons for social or commercial motivations and effective encounters. Most of these referral systems assume that those people you regard as friends are more likely to be become friends of each other than of a random selection of individuals. Thus, mining both weak and strong connections allows us to become acquainted with, and possibly work or learn together with others, with a greater probability of developing profitable exchanges. This system 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 to determine the past contribution of learners to other learners or, more broadly, to the learning community.

Helping Others

The study group and study buddies have long been features of successful 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 et al., 2001). For each student, the I-Help system configures an autonomous agent that knows its owner's skills, preferences, and fiscal capacity (in real or play money) to provide and request help from other students. When students require help, they release their agent into the learning space to negotiate with the agent of another, more skilled learner. These negotiations may lead to a request for help by email or telephone, the 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 the capability to meet each other has raised some faculty concerns about the increased possibility and efficacy of such activities; it threatens our on-demand, continuous exam system that seems to be based upon an assumption that students are not in contact with each other. Since these concerns also affect campus-based systems, 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 attempting to eliminate it.

Documenting and Sharing of Constructed Objects

Much formal learning is based on students learning and relearning a very slowly evolving body of knowledge. Educational strategies designed for such contexts are not highly productive in contexts when useful information and knowledge is under continuous revision. More currently, educational authors (Grabinger & Dunlap, 2002; Collis, B., & 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 that was initiated months or even years before by other students. Wikis and collaborative blogs are first-generation tools to support this type of interaction. However, more sophisticated tools are needed, capable of including multimedia, tracking both contributor and learner use, controlling access to creation tools, and assessing learning outcomes.

From the generic potential functionality of ESS, this chapter now moves to specific descriptions of ESS tools, focusing on those that are open source and available. In particular, I give an overview of 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 (ESS) TOOLS

Many of the social software tools developed for business, social, and entertainment activities 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 they do not allow the freedom to design and create value-added instances of ESS that are customized for particular groups of learners, nor do they provide the type of security and control demanded by many formal education institutions.

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, we limited our search for a development platform for our use to 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 discovered two OS tools that were already focused on ESS use. BarnRaiser offers an interesting program known as the Aroundme platform (http://www.barnraiser.org/index.php?wp=software). The current version (1.5) offers the usual blogging, polls, group tasks, and a very interesting tool to measure the "social capital" of contributors. The second tool, ELGG (version 0.90, http://elgg.org), offers many of the same tools, and was chosen for our installation due to the strength of its ad hoc folksonomie-style linkages, its provision for individual control of personal information and postings, its support for e-portfolios, and its 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).

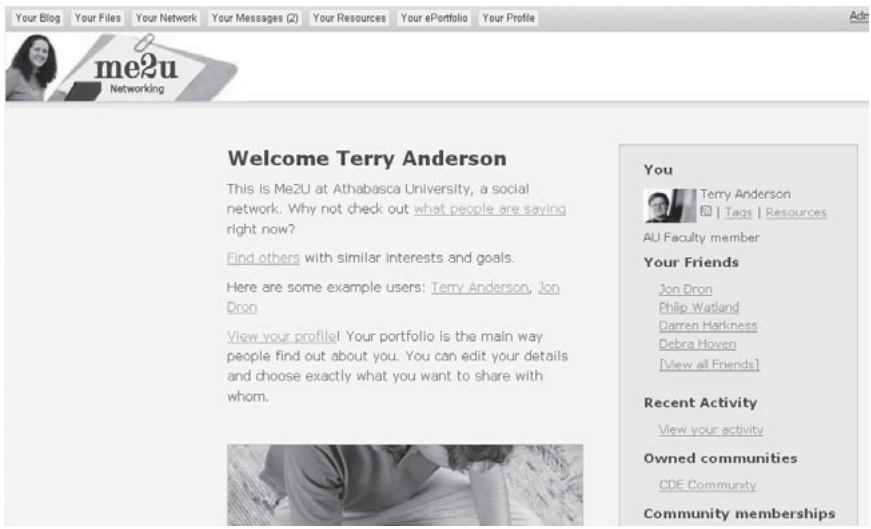

Figure 2. Me2U.athabascau.ca

We were interested in testing an ESS application within formal education programs, and have chosen to create a resource that is exclusive to students registered at our institution. Downes (2005) and others argue that such "silos" are inherently restrictive, but they do 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. ELGG has what we believe to be the most versatile privacy control system in current ESSs. Figure 3 illustrates how the display of every field of information in a learner's profile, plus all the items in their e-portfolio and their blog postings, can be restricted to only the author, their friends, particular communities, logged-on members (registered Athabasca University students), or the general public (including search-engine spiders).

There has also been considerable debate about the role of ESS in relationship to the more firmly established learning management systems, such as *Blackboard* or *Moodle*. I have compared the affordances of both systems elsewhere (Anderson, 2006b) and concluded that "personal learning systems" do not offer the types of document control and learner management currently built into LMS systems. It is also interesting to note the inclusion of blogs, profiles, wikis, e-portfolios, and other

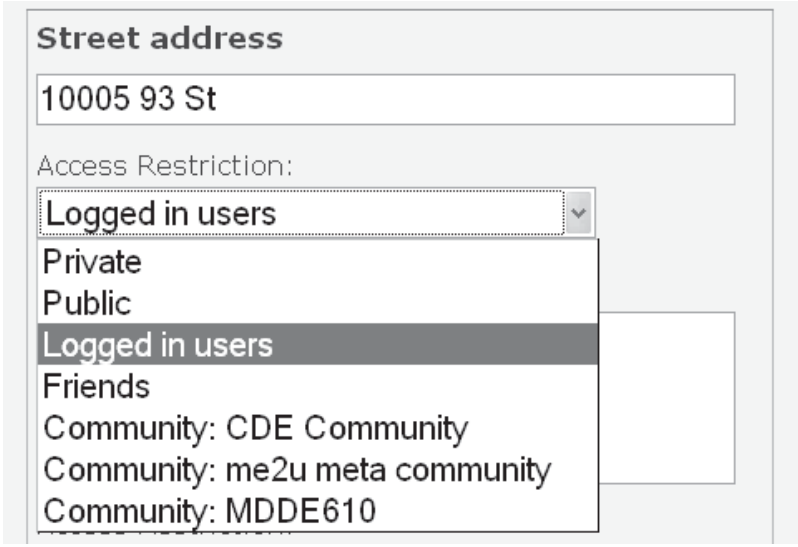

Figure 3. Selecting Access provisions in ELGG

social tools in the ever-growing, monolithic LMS systems. Debate about the advantages of personal versus institutional systems is beyond the scope of this chapter, but current developments portray an interesting future as Web 2.0 tools increase the capacity for working together (mash-ups). This development will allow for very fine-tuned customization of learning contexts, not just by teachers and administrators, but by students, as they gain control over their own learning environments.

Design-based Research Development of Me2U

The final section of this paper describes our research design used to assess this intervention. 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 informed exploration. Our earlier 2004 survey of student experience with interactive interventions and consultations with global distance educators (Anderson, Annand, & Wark, 2005) has set the stage and detailed the need for social software solutions. Our primary focus is on students enrolled in unpaced and continuous enrollment courses. We hope to design an informal place for the 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 to 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 plan to work with our colleague (Morten Paulsen) at the Norwegian Knowledge Institute in Norway 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 to support the learning community while retaining student freedoms.

In the third phase, our educational social software interventions are piloted in one or more local contexts. We are working 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 Phases 2 & 3 to a wider variety of contexts. The evaluation tools that have proved most useful in pilot testing and development in Phase 3 will be refined and used to gather data across these diverse sites. And 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 theories and tools developed in the earlier phases of this 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 its 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 affordances 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 app" 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!

NOTES

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REFERENCES

Allen, C. (2004). Tracing the evolution of social software. *Life with alacrity*. Retrieved Dec 14, 2007, from http://www.lifewithalacrity.com/2004/10/tracing_the_evo.html

Anderson, T. (2003). Getting the mix right: An updated and theoretical rational for interaction. *International Review of Research in Open and Distance Learning*, 4(2). Retrieved Dec. 14, 2007, from http://www.irrodl.org/index.php/irrodl/ article/view/149/708

Anderson, T. (2004). The educational semantic web: A vision for the next phase of educational computing. *Educational Technology, 44*(5), 5–9.

Anderson, T. (2006a). Higher education evolution: Individual freedom afforded by educational social software. In M. Beaudoin (Ed.), *Perspectives on the future of higher education in the digital age*. New York: Nova Science Publishers.

Anderson, T. (2006b). PLEs versus LMS: Are PLEs ready for Prime time? *Virtual Canuck*. Retrieved Dec., 2007, from http://terrya.edublogs.org/2006/01/09/ples-versus-lms-are-ples-ready-for-prime-time/

Anderson, T., Annand, D., & Wark, N. (2005). The search for learning community in learner-paced distance education programming or "having your cake and eating it, too!" *Australian Journal of Educational Technology, 21*(2), 222–241. Retrieved Dec. 12, 2007, from http://www.ascilite.org.au/ajet/ajet21/res/anderson.html

Anderson, T., & Wark, N. (2004). Why do teachers get to learn the most? A case study of a course based on student creation of learning objects. *e-Journal of Instructional Science and Technology, 7*(2). Retrieved Dec.11, 2007, from http://www.usq.edu.au/electpub/e-jist/docs/Vol7_no2/FullPapers/WhyDoTeachers.htm

Anderson, T., & Whitelock, D. (2004). The educational semantic web: Visioning and practicing the future of education. *Journal of Interactive Media in Education, 1*. Retrieved Dec. 16, 2007, from http://www-jime.open.ac.uk/2004/1

Annand, D. (1999). The problem of computer conferencing for distance-based universities. *Open Learning, 14*(3), 47–52.

Arbaugh, B. (2007) An empirical verification of the community of inquiry framework. *Journal of Asynchronous Learning Networks, 11*(1). Retrieved Dec. 14 2007, from http://www.aln.org/publications/jaln/v11n1/pdf/v11n1_9arbaugh.pdf

Bannan-Ritland, B. (2003). The role of design in research: The integrative learning design framework. *Educational Researcher, 32*(1), 21–24. Retrieved Dec. 14, 2007, from http://www.aera.net/uploadedFiles/Journals_and_Publications/Journals/Educational_Researcher/3201/3201_Ritland.pdf

Bersin, J. (2004). Blended learning: Finding what works. *Chief Learning Offficer, 1*. Retrieved Dec., 2007, from http://www.clomedia.com/content/templates/clo _feature.asp?articleid=357&zoneid=30

Boticario J.G., Santos, O.C., & Rosmalen, P. (2005). Technological and management issues in providing adaptive education in distance learning universities. EADTU. Retrieved Dec. 19, 2007 from http://www.ia.uned.es/~jgb/publica/ TechMngIssuesALMS-jgbosmpvr.pdf

Butterfield, S. (2003). Sylloge. Retrieved Feb. 12, 2008, from http://www.sylloge .com/personal/2003_03_01_s.html

Cervini, A. (2003). Network connections: An analysis of social software that turns online introductions into offline interactions. Unpublished

Master's thesis. New York University. Retrieved Mar. 21, 2008, from http://www.frimfram.com/thesis/ print.html

Coates, T. (2002). My working definition of social software... *plasticbag.org blog*. Retrieved January, 16, 2006, from http://www.plasticbag.org/archives/2003/05/my_working_definition_of_social_software/

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world*. London: Kogan Page.

Downes, S. (2005). Semantic networks and social networks. *The Learning Organization, 12*(5), 411–417. Retrieved Dec.,10, 2007, from http://www.downes .ca/cgi-bin/page.cgi?post=31624

Dron, J. (2004). Termites in the schoolhouse: Stigmergy and transactional distance in an e-learning environment. In *AACE* (Ed.). Retrieved Dec. 14 2007, from http://www.cmis.brighton.ac.uk/staff/jd29/papers/dronedmedia2004.doc

Dron, J. (2007). *Control and constraint in e-learning: Choosing when to choose*. Hershey, PA: Information Science Pub.

Dron, J., & Anderson, T. (2007). Collectives, networks and groups in social software for e-Learning. Paper presented at the *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* Quebec. Retrieved Feb. 16, 2008, from www.editlib.org/index.cfm/files/paper_26726.pdf?fuseaction=Reader.DownloadFullText&paper_id=26726 -.

Fielden, J. (2002). Costing e-learning: Is it worth trying or should we ignore the figures? London: The Observatory on Borderless Higher Education. Retrieved Sept. 16, 2005, from http://www.obhe.ac.uk/products/reports/pdf/August2002.pdf

Friesen, N., & Anderson, T. (2004). Interaction for lifelong learning. *British Journal of Educational Technology, 35*(6), 679–688.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in text-based environments?: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2-3), 87–105. Retrieved Dec. 14, 2007, from http://communitiesofinquiry.com/documents/CTinTextEnvFinal.pdf

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education, 7*(2), 95–105.

Grabinger, S., & Dunlap, J. (2002). Applying the REAL model to web-based instruction: An overview. In P. Barker & S. Rebelsky (Eds.), *Proceedings of 2002 World Conference on Educational Multimedia, Hypermedia*

and Telecommunications (pp. 447–452). Chesapeake, VA: AACE. http://www.editlib.org/index.cfm?fuseaction=Reader.ViewAbstract& paper_id=10128

Greer, J., McCalla, G., Vassileva, J., Deters, R., Bull, S., & Kettel, L. (2001). Lessons learned in deploying a multi-agent learning support system: The I-Help experience. *Proceedings of Artificial Intelligence in Education, 2001.* Retrieved Dec. 4, 2007, from http://julita.usask.ca/Texte/Aied01-camera.pdf

Jones, S., & Johnson-Yale, C. (2005). Professors online: The Internet's impact on college faculty. *First Monday, 10*(9). Retrieved Sept. 13, 2007, from http://firstmonday.org/issues/issue10_9/jones/

Kester, L., Sloep, P., Van Rosmalen, P., Brouns, F., Kone, M., & Koper, R. (2007). Facilitating community building in learning networks through peer tutoring in ad hoc transient communities. *International Journal of Web Based Communities, 3*(2), 198–205. Retrieved Dec. 16, 2007, from http://dspace.ou.nl/bitstream/1820/ 609/4/Facilitating +Community+Building+-+titlepage.pd

Koper, R. (2005a). Designing learning networks for lifelong learners. In R. Koper & C. Tattersall (Eds.), *Learning Design* (pp. 239–252). Berlin: Springer.

Koper, R. (2005b). Increasing learner retention in a simulated learning network using indirect social interaction. *Journal of Artificial Societies and Social Simulation, 8*(2). Retrieved Jan.8, 2006, from http://jasss.soc.surrey.ac.uk/8/2/5.html

Lazarus, B. (2003). Teaching courses online: How much time does it take. *Journal of Asynchronous Learning, 7*(3). Retrieved Dec. 1, 2003, from http://www.aln.org/publications/jaln/v7n3/v7n3_lazarus.asp

Levin, A. (2004). Social software: What's new. *Many 2 Many.* Retrieved Dec., 2007, from http://www.alevin.com/weblog/archives/001492.html

McCalla, G. (2004). The ecological approach to the design of e-learning environments: Purpose-based capture and use of information about learners. *Journal of Interactive Media in* Education*, 10.* Retrieved Dec. 12, 2007, from http://www-jime.open.ac.uk/2004/7/

O'Reilly, T. (2005) What is Web 2.0: Design patterns and business models for the next generation of software. Retrieved Feb, 2008, from http://www.oreilly.com /pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html

Paulsen, M. (1993). The hexagon of cooperative freedom: A distance education theory attuned to computer conferencing. *DEOS, 3*(2).

Retrieved Dec. 16, 2007, from http://www.nettskolen.com/forskning/21/hexagon.html

Ramage, T. (2005). A system-level comparison of cost-efficiency and return on investment related to online course delivery. *E-Jist, 8*(1). Retrieved Dec. 14, 2007, from http://www.usq.edu.au/electpub/e-jist/docs/vol8_no1/fullpapers/ Thomas_Ramage.pdf

Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks, 7*(1). Retrieved Dec. 14, 2007, from http://www.sloan-c.org/publications/jaln/v7n1/pdf/v7n1_richardson.pdf

Rourke, L., & Anderson, T. (2002). Exploring social presence in computer conferencing. *Journal of Interactive Learning Research, 13*(3), 259–275. Retrieved Dec.14, 2007, from http://communitiesofinquiry.com/documents/ Rourke_Exploring_Social_Communication.pdf

Rourke, L., Anderson, T., Archer, W., & Garrison, D. R. (1999). Assessing social presence in asynchronous, text-based computer conferences. *Journal of Distance Education, 14*(3), 51–70.

Rumble, G. (2004). *Papers and debates on the economics and cost of distance and online learning.* Oldenburg: University of Oldenburg.

Shirky, C. (2003). A group is its own worst enemy. *Clay Shirky's writings about the Internet.* Retrieved Dec. 14, 2007, from http://www.shirky.com/writings/ group_enemy.html

Shute, V., & Towle, B. (2003). Adaptive e-learning. *Educational Psychologist, 38*(2), 105–114. Retrieved Dec. 2, 2007, from http://www.leaonline.com/doi/abs/ 10.1207/S15326985EP3802_5

Stacey, E. (2002). Social presence online: Networking learners at a distance, education and information technologies. *Education and Information Technologies, 7*(4), 287–294. Retrieved Dec. 16, 2007, from http://www.springerlink.com/content/ m3370313r055xh73/

Stutzman, F. (2007). Thoughts about information, social networks, identity and technology. *Unit Structures.* Retrieved Dec.3, 2007, from http://chimprawk.blogspot.com/2007/11/social-network-transitions.html

Towle, B., & Halme, M. (2005). Designing adaptive learning environments with learning design. In R. Koper & C. Tattersall (Eds.), *Learning Design* (pp. 215–226). Berlin: Springer.

Tu, C.H. (2002). The measurement of social presence in an online learning environment. *International Journal on E-Learning, 1*(2), 34–45.