Cultivating a Community of Practice: Designing The TeleLearning Exchange

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Abstract
CSCW is one mechanism by which the TeleLearning Exchange Project promotes collaboration in the interdisciplinary research of the TeleLearning Network of Centres of Excellence (TL-NCE). Affiliated researchers are encouraged to share informal knowledge of their projects via three major strategies: site visits by an integration officer, a community web repository (http://teleport.techbc.ca) and collaborative visits by students. An informal goal of the TeleLearning Exchange is to scaffold the next generation of collaborative researchers by actively involving students affiliated with the TL-NCE as agents of interdisciplinary cooperation and technical integration. This paper describes the design and development issues surrounding a web repository tool to build a community of practice.

1 Introduction
Since 1995, Canada’s TeleLearning Network of Centres of Excellence (TL-NCE) has brought together approximately 120 public and private sector partners to explore emerging network technologies for impact in education and training.[1] This collaborative research organization has been fortuitous in its timing. The global spread of the Internet has lead to an unprecedented acceptance of e-learning as a favored mechanism for distance education. Given the pressing demands for R and D in information technology, and the difficulties of interdisciplinary collaboration especially across Canada’s space and time obstacles, the Systems Models Theme of TL-NCE sought additional mechanisms to create and reinforce a community of collaborative research. Complementing the traditional integration methods of site visits and conferences, The TeleLearning Exchange [2] was launched as a community web repository that encourages researchers affiliated with TL-NCE to contribute informal project knowledge, and the explicit strategy of employing graduate students as agents of collaboration and integration. This paper discusses the TeleLearning Exchange as an example of computer supported cooperative work, with particular emphasis on its functional design and the complementary strategies employed to spread its acceptance and use.

2 Communities of practice
Although present before the Guilds, the benefits of a community of practice have been most recently documented by Seely-Brown and Duguid [3]. Formal and informal networks of work and study provide mechanisms for sharing common practice, disseminating technical information, and seeking social support. In a vast country such as Canada, networks play an important role in linking researchers together to form a critical mass of scientists to tackle large technical and social problems. In this regard, Canada’s Network of Centres of Excellence (NCEs) are unique partnerships among industry, universities and government designed to connect excellent research with industrial know-how and practical investment [4]. The advantages of networks are strongest if the researchers can be kept in constant communication with each other, unfortunately this would leave little time to pursue local initiatives, or fulfill other academic obligations.

Communication, and technical integration are essential elements of collaborative research, and while they are of enormous value, they also require effort. It takes time to write formal papers, attend conferences and to travel to distant research sites to share ideas with the community of
practice. The cost in time and resources is such that not all members of a research group may attend so opportunities to participate in the formal and informal rites of community building are not shared equally. Indeed, the venerable members of the community of practice are the best networked and the most active participants, while those with fewer personal connections (typically new researchers and students) have reduced opportunity to participate.

There is a difference between collaboration and sharing. It is the authors’ belief that collaboration is easier to promote early in a project through exchanges of informal information. Formal sharing of information is effected through publication. This requires waiting for a longer period and it usually only becomes available at a stage where the main research direction is set and collaboration is less likely to have significant impact.

3 Promise of network technology

Internet technology provides the opportunity to attenuate the isolation of time and space. Applications such as e-mail, Internet telephony, and group work can reduce the overhead in distance collaboration. In particular, web sites provide a low cost publishing mechanism for disseminating research results. In the domain of research and new technologies, the pace of development is fast and is more in pace with Internet publication than paper exchanges. Even for reviewed journals, more and more journals are now developing an electronic version which can be diffused faster, wider and at a lower cost.

A by-product of the ease of publication has been a relaxation in the formality of publication. Unlike a paper which is locked into its hard copy the moment the press is run, web sites are malleable. Web content can be changed relatively easily, so authors are encouraged to post less formal information: information that seeks input from its audience, and engages discussion in the community of practice. Web sites also are also more easily referenced: URLs can be shared with collaborators, formally attached to curriculum vitae, offered as reference in courses or simply referenced to from other web documents.

4 Repository sites for integration and collaboration

A web repository is a centralized collection of information placed on-line by members of a community. These “information objects” may be works in progress or final. A repository provides fast and wide-reaching dissemination, but of more interest to our goals of community building is the potential for feedback and iterative development of the work with other members of the community.

An early lesson in the creation of community web sites was that all authors are not blessed with equal knowledge of HTML and web mastery. In 1995 Richards [5] created SEEDS, a focal site for a community of practice in educational technology. While this early repository received much initial recognition, the awkwardness of the HTML editing process dissuaded long-term perpetuation of the site. In essence, the cost of contributing new information was too high, and interest died off as the initial content became stagnant. For a site to self-perpetuate it must facilitate the activities of its community while bringing some savings in time, costs or energy to do tasks that would normally be done by some other means.

Several repositories now exist where contributors can post their work without running the gamut of a formal editorial authority, in the expectation that others will add beneficial comment and suggestions for improvement. The objects deposited may be textual, graphic, multimedia, or interactive in nature. For example, MERLOT [6] (www.merlot.org) is a repository for learning objects sponsored by a consortium of North American universities and colleges. Members contribute java applets, and multimedia demonstrations that can be used in a variety of teaching scenarios. Other members of the community can view the learning objects, and post comments and lesson plans for their use.

Repositories are also used as tools for knowledge management. Hatala[7] developed CEDAR – Conceptually Enriched Document Archive – a tool developed at The Knowledge Media Institute, UK for organizational learning systems [8]. CEDAR facilitated the depositing of documents which could then be annotated or commented on in an appended discussion forum. Readers within the organization could freely add related links to other sites or demonstrations, or upload related documents. As distributed authoring renders impractical strict hierarchical organization, cataloguing, meta-tagging and search engines take on new importance in management and usability of the content. As is the case with any repository, to have up-to-date content, the addition of new information reflecting the development in each particular area must be assured and supported. This work is carried out, drawing on the work of Gantt and Nardi [9] by local developers (similar to our “integration agents”) who are members of the research teams, but have a greater familiarity with tools and methodology.

5 Design guidelines

5.1 Efficiency

The repository must load quickly and be easy to use. The interface in our case also needed to be bilingual
5.2 Structural Coherence

The hierarchy must reflect the formal project structure of the TL-NCE. In addition, it must support additional structures which arise over time as research interests cross the vertical boundaries and as community members bring in new interests and new members from outside their immediate project. It is expected that distributed authoring will result in a variety of structures. Good navigational aids and search engines can reduce the complexity.

5.3 Extensibility

Extensibility reflects the values of the community in terms of its membership and the scope of the site. While some repositories e.g. MERLOT, allow anyone to join the community, we required introductions. Any member of the community is able to extend membership to newcomers to the community. Members are also welcome to add additional pages or branch on new research clusters.

5.4 Community Responsibility

This is a hierarchy of responsibility that allows content or authors deemed to be unacceptable to be removed. We used the inherent tree-structure of our database to create spheres of responsibility. Every member is responsible for the behavior and content of those in their sphere of responsibility. The site administrator has the ultimate responsibility to investigate complaints and in consultation with the community, take corrective action.

5.5 Security and Privacy

Only documents of a certain formats and size will be accepted to the main repository. Executable code demonstrations are allowed to be linked to but not to reside in the repository. Authors may designate their pages to be public or private (password protected). This allows for distant workgroups to shelter early work that is not ready for dissemination.

5.6 Bidirectional Information Flow

In addition to pulling information from the community, monthly updates or urgent messages can be pushed to the community. A regular scan of the database identifies new or updated materials, which can be scanned by the site administrator for inclusion in an electronic newsletter to the community. Some consideration has been given to automating parts of this process. This enlarges the possible impact of contributions in the repository, making it accessible, not only to a core more active researchers but also to those who follow the progress of the community.

5.7 Participation Incentives

A repository requires ongoing incentives to contribute and participate. The TeleLearning Exchange is developing a rewards program is planned whereby authors of significant contributions can be provide travel opportunities for visits to research sites, exchanges and to attend conferences – activities which provide even closer collaboration, networking opportunities. Interdisciplinary exchange may also counter the impact of competition among themes, and encourage faster reporting of results.

5.8 Architectural Flexibility

The exchange needs to be open to suggestion from its community and easy to modify as the needs or structure of the community change. Architecturally it is important to emphasize a database approach, separating the elements of style and structure from the content itself.

5.9 Openness

The Exchange encourages the diffusion of international information in the domain in general, so researchers are motivated to visit on a more regular basis. Their contribution on the state of the art is precious and serves as a shared "Technological watch", where the most recent advances can be confronted.

These broad guidelines were developed through a collaborative design process. We started with a basic knowledge of the user community and let the TeleLearning Exchange grow by an iterative design process. NCE members were invited to use the site and report on its strengths and weaknesses. In many cases, doing so allowed them to refine their own experience and expectations of what such a service could support, influencing both the next design version and their commitment to collaborative research. While the essential guidelines remain the same, this ongoing process has continued to shed light on which aspects of the TeleLearning Exchange are most functionally useful and where the gaps are.

6 Experience to date

Technically, the Exchange builds on Hatala’s CEDAR.
After initial prototyping in Lisp, the system was re-coded to use Active Server Pages with a SQL7 database. Students affiliated with TL-NCE Theme 3 projects provided content and links to project home pages. Significant consultation and formative evaluation of the user interface was provided by Dufresne and her students at the Université de Montréal. The project was subsequently demonstrated at the TeleLearning 2000 Conference in Toronto, where it garnered the People's Choice Award in the Demonstration Category. Based on feedback and observations from users, the design has been streamlined. We are pruning some features because they are simply not used – for example, instead of allowing the public to add demonstrations and links, this privilege is restricted to registered authors. At time of writing (February, 2001) the interface conversion to French has been completed and the use of the site is expanding from Theme 3 to the rest of the TeleLearning-NCE. Figure 1 illustrates one view of a project in the repository.

The quest for content remains a challenge. While the use of graduate students as integration agents remains viable in principle, the current economic demand for information technologists has diminished the number of available graduate students with strong communication skills in English or French. This is expected to be a temporary problem and does not appear to extend to the education and communications themes of the TL-NCE.

### 7 Future Plans

Coupling the repositories with other collaboration strategies will be key to the promotion of research collaboration. One strategy under consideration is for TL-NCE to use the exchange as the submission channel for an electronic journal. Submissions could be screened on a monthly basis and key contributions would be summarized and pushed back to the TL-NCE community. Authors would be encouraged not only to report on their research activities, but also to identify potential collaborators within the network. An incentive program of physical site visits to enable face-to-face collaboration is being considered for selected papers. Given our NCE mandate to prepare highly qualified people (HQPs) many of the strategies reinforce the participation of graduate students, but always in the context of their affiliation with the Principal Investigators of the TL-NCE. Consideration is also given to creating a resume drop for affiliated students and researchers as a method to acknowledge their contributions, and to demonstrate the

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**Figure 1.** A view of a one project in the repository
HQP output of the NCE. An unexpected outcome of the TeleLearning Exchange has been the growth of an extended project team of developers, evaluators, content contributors and reviewers. The development of the site has been itself an exercise in community building. It has brought closer collaboration with other TL-NCE community building activities such as the Global Educators Network, the TL2000 conference, and the main TL-NCE web site. We find we cannot preach collaboration without collaborating ourselves.

8 Summary

In this paper we have explained the context and development of The TeleLearning Exchange. We have outlined our design guidelines for the creation of community building repositories, and briefly explained our experiences and intentions. Our initial findings lead us to believe that such repositories can be effective tools for disseminating results, stimulating collaboration in research, and networking the next generation of collaborative researchers. However, web repositories need to reflect the needs of their communities and provide utility to their users. As such they need to be employed in the context of wider strategies for the integration of research.

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10 References


