Telelearning Research and the TeleLearning-Network of Centres of Excellence

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Abstract

This article provides a personal perspective on funding and organizational issues related to e-learning, distance education, and other distributed forms of educational technology research. It examines the largest single investment made in this area by the Canadian federal funding councils: the TeleLearning Network of Centres of Excellence (TL•NCE). The article presents an overview of the rationale and need for expanded TeleLearning research at both basic and applied levels. It discusses (and critiques) other funding sources and ends with a call for a renewed and expanded commitment to the multidisciplinary research area that encompasses e-learning and online teaching.

Résumé

Cet article fournit une perspective personnelle sur les questions de financement et d'organisations concernant la recherche en technologie éducative portant sur le *e-learning*, l'éducation à distance ainsi que d'autres formes de formation distribuées. Cet article examine l'investissement unique le plus important fait dans ce domaine par les Conseils de recherche canadien: le réseau de recherche en téléapprentissage du réseau des centres d'excellence canadien. L'article présente le rationnel et des besoins d'élargissement de la recherche, à la fois fondamentale et appliquée, en téléapprentissage. L'auteur discute (et critique d'autres sources de financement) et conclut avec un appel pour un engagement renouvelé et élargi quant à la nécessité de la recherche multidisciplinaire sur le *e-learning* et la formation en ligne.

Introduction

The Networks of Centres of Excellence (NCE) Program is the largest individual research funding program operated by the Government of Canada's research councils in support of quality collaborative research. Currently 20 NCEs are operating (see http://www.nce.gc.ca), each with an annual budget of between three and six million dollars. Although supported by all three of Canada's federal granting councils, including the Social Science and Humanities Research Council, only one of the current networks is focused on social science or the humanities.

The TeleLearning-NCE (TL•NCE) was funded for seven years from 1995 to 2002. It represented a coordinated effort at basic and applied research related to the intersection of telecommunications, pedagogy, and information science. TL•NCE was broadly focused on all levels of formal and informal, private and public sector training and education research. The

award of an NCE is a competitive process with intense competition from research scientists in all disciplines. The 1994 competition saw two education-related projects pass the initial letter-of-intent stage to compete for the major NCE funding. In any competition there are winners and losers. I was associated with the losing team and thus was (reluctantly) cast in the role of a gadfly in the TeleLearning network. As an active educational technology researcher, I was intensely interested in the field of research, but not in a position to receive direct funding from the project. However, educational technology-related research in Canada operates on a small playing field, and thus I was able to observe and participate through attendance at conferences, review of published results, Web site discussions, and through direct dialogue with colleagues. This article documents this outsider's view and suggests alternative ways that basic and applied research in emerging and strategically important areas could be conceived and organized. It concludes with an account of my own unsuccessful efforts to lead a second NCE focused on the application of telelearning research findings and other related educational and information science research. The article ends with a call for government, commercial interests, researchers, and practitioners to recommit to the critical task of preparing Canadians for a third-wave information age (CANARIE, 2002) through the development and provision of the highest quality learning and training opportunities.

Telelearning as Basic Research

Although there are many (often contentious) ways to define and classify research (e.g., see a list of definitions at http://www.phcris.org/resources/research/research_frameset.html), it is clear that the multidisciplinary and widely diffuse nature and context of education and training that uses information and communications technologies requires multiple research perspectives. Thus both fundamental or basic research as well as applied, developmental, and evaluation research are needed to create a complete and synergetic picture of telelearning research. Education as an applied profession is most often associated with applied research. However, the field also benefits from more basic research. For example, the depth of knowledge and technique needed to develop education and learning projects associated with educational applications that take advantage of the emerging semantic web (Berners-Lee, 1998) requires expertise from the multiple disciplines and applied fields. This work is predicated on developing and implementing complex ontologies and modeling languages that can be used to describe formally and retrieve educational resources and interactions and creating autonomous student, teacher, and content agents to increase education efficiencies. These are complex topics requiring high levels of expertise and understanding. This knowledge is inherently transdisciplinary and requires in-depth knowledge from fields as diverse as information and library science, computer science, philosophy, psychology, library science, linguistics, sociology, and software engineering. My own cursory review of the published articles from TeleLearning researchers shows me that work done in TL•NCE on some of these fundamental issues has made a significant contribution to both basic and applied science.

There have been calls for a change of research focus in education to case studies, development and implementation research, and other techniques of a more applied nature. As practical and seductive as these calls are, they must be accompanied by equally strong support for research on more basic research questions. It is ironic that I have heard the TL•NCE criticized as being too theoretical and "ivory tower" and at other times as being neither rigorous nor sufficiently scientific to meet research scholar standards. Perhaps these dichotomous criticisms reflect the achievement of an appropriate balance between these two views of research priority.

Telelearning as Academic Research

Like other research council projects, TL•NCE was designed to stimulate and support original research. The mission of the NCEs is "to mobilize Canada's research talent in the academic, private and public sectors and apply it to the task of developing the economy and improving the quality of life of all Canadians" (from original NCE literature, 1989). The three Canadian funding councils largely support research of both a fundamental and an applied nature, most of which is focused on university-based research. However, in an era of increasing private-sector interest and involvement in research with potential profitable economic spin-offs, it was expected that private-sector partners would be involved as both contributing partners and collaborating researchers. Their role was seen as stimulating short- and long-term commercialization of NCE research results.

As with all research council funding, expert peers adjudicate NCE applications and renewals. This selection process is justified by arguments that active university-based researchers, those with the most subject matter expertise and experience, are best qualified to judge both the value and the feasibility of the proposed research agenda. This process, however, greatly disadvantages research that falls outside the current research paradigm(s). Gibbons (1999) has described the trend for knowledge production as moving from traditional, discipline-focused, and controlled processes (Type 1 knowledge production) to an emerging application-based research (Type 2 knowledge production). Type 2 knowledge production is multidisciplinary work in a transient environment that focuses on solutions to application driven problems. Type 2 knowledge production is no less scientific, rigorous, or fundamental than Type 1 knowledge production. However, it is far less constrained by discipline boundaries or established gatekeeping structures. Type 2 production focuses on problem solutions with immediate application. These problems usually require exploration and solution of fundamental and basic research in an organizational structure that is marked not by discipline-based norms and control structures, but by heterogeneity and organizational diversity. Thus Type 2 production is also more responsive and accountable to a variety of social and economic controls and inputs. Finally, Type 2 research problems are of a diverse and usually complicated nature such that solutions come only with expertise from across and among various disciplines.

From these descriptions it seems that TeleLearning research is a classic form of Type 2 knowledge production and that the group of educational researchers, economists, computer scientists, communication specialists, and other social scientists gathered under the TL•NCE were a network of transdisciplinary scholars appropriate to the demands of this type of knowledge generation. Unlike other typical Type 2 research projects such as the construction of a new spacecraft or the decoding of the human genome, there was no single focus or problem that clearly defined when the Telelearning project had achieved its objectives. Thus it remained a challenge for the management board of TL•NCE to be continually knitting together the diverse themes that defined the research agenda. A further challenge was ensuring that results were shared and used by the physically dispersed teams associated with each of the seven major themes.

In general, Type 2 research is difficult to squeeze into the mold necessary for successful Canada Research Council funding. Most critically, major Type 2 projects generally lack a single established and structured discipline to ground expectations, philosophy, methodology, and operation parameters of the research. TL•NCE was vulnerable to criticism from existing research groups and evaluative criteria operating from a Type 1, discipline-centered knowledge-production paradigm. Thus the failure to continue funding TeleLearning for a second

term, using criteria established by Type 1 cultured evaluators, is not surprising. However, the need for supporting and expanding research relating to the social, economic, technical and pedagogical underpinnings of telelearning-focused research remains critical.

Telelearning as Action Research

Like the efforts of most academic-based researchers, the investigators of the TL•NCE focused their efforts primarily on developing theories, tools, and techniques for application by others: presumably teachers, trainers, and students. However, Telelearning NCE existed at a time of exploding interest and deployment of educational technologies at all levels of formal and informal education and training (Haughey, 2002). Computers and telecommunications technology and networks were being deployed at considerable cost and effort in schoolrooms, university classrooms, and training facilities across the country.

It was assumed that knowledge generated in the project would trickle down through normal channels of academic publication and commercialization to the nation's classrooms and training facilities. Unfortunately, educational research does not have a great track record of meeting these dissemination expectations. Many critics have noted the lack of fundamental change in instructional design, learner activity, or evaluation in the nation's classrooms despite over 100 years of educational research (see, e.g., Bates, 2001).

Could it be that this disconnect is one result of funding and evaluating research in a context that is so fundamentally different from its eventual application that transference is highly unlikely? More important, are Canadian taxpayers making the most effective use of their educational research funding by supporting the investigations of a few highly qualified experts in restricted domains? Are our educational and training systems not themselves a huge research laboratory ripe for the generation of both basic and applied knowledge?

A particular form of action research, known generically as the scholarship of teaching (Boyer, 1990), may well provide a model for future telelearning-related research projects. The scholarship of teaching goes beyond reflective practice that characterizes quality teaching and emphasizes the criteria of public scrutiny, dissemination, transparency, and transference capability of quality education practice. Given that most Research Council-funded researchers are practicing university teachers, a focus on the scholarship of teaching might well improve local practice and provide entry points for research results to inform practicing educational development and delivery.

The promise of action research is to engage practitioners in reflective and scientific study, analysis, and manipulation of their own working context so as to both solve immediate problems and discover new knowledge. Action research begins with practitioners identifying real problems; investigating and reflecting on how they can intervene to resolve these problems; and gathering data to assess the efficacy of their intervention. However, such forms of research are generally not supported by the research councils and often derided as amateur research that is not likely to lead to the type of fundamental and basic research that defines the traditional university research paradigm. Research in this traditional paradigm is deemed to be an elite activity only capable of competent execution by a small cadre of full-time academics.

It seems apparent that telelearning research needs to benefit both from action research and from more traditional academic forms of research. Developing funding, governance, and accountability structures that encompass and support both these forms of research is challenging and, I argue, now beyond the capacity for support and critical review by the existing research council funding and evaluation mechanisms.

Telelearning as Networked Research

CANARIE Inc. (www.canarie.ca) recently produced a report for Canada's Innovation Strategy entitled *Using Networks for Innovation: A National Strat-egy for Canada* (2002). The report highlights the need for e-learning research but, as important, notes the advantage of exploiting the power of networks to enhance research network productivity.

To its credit, TL•NCE's Global Educators Network (GEN) succeeded in engaging over 1,100 participants from 43 countries in a series of 49 text-based, asynchronous "virtual conferences" (see http://vu.cs.sfu.ca/ vu/tlnce/PublicReg/PR_Register.cgi#past for a listing and access to the archives of these conferences). This discourse (and the resulting archive) is perhaps the greatest legacy of the project and illustrates the power and value of virtual conferences. However, impressive as 1,100 registered participants may sound, this represents a small fraction of the world's practicing researchers in telelearning-related areas, much less the number of practitioners engaged in using telelearning for teaching and learning. No type of push mechanism or RSS style dissemination tool (Downes, 2002) was developed that would allow searching and filtering of discussion, announcements, results, or questions for telelearning researchers from practitioners. Attempts by TeleLearning administrators to develop more effective dissemination vehicles were stymied by the lack of incentive for researchers to publish or discuss their work in any but peer-reviewed academic publications.

New network-based collaboration and dissemination tools provide a platform on which new partnerships among researchers and practitioners can be forged. In a recent book on e-research (Anderson & Kanuka, 2002), we documented how collaborative tools can be used by teams of distributed researchers and, as important, the networks can be used to enhance traditional forms of dissemination so as to improve practice and support exchange and improvements of research results among practitioners and researchers. Willinsky (2002) argues,

> We have also to realize that going public with our research will gradually change how we conduct our studies in and outside of schools, how we write about and connect our work to other studies, as well as to larger and local worlds of information. (p. 392)

TL•NCE scratched the surface of networked research. Future networked educational research projects need to work even more diligently to gain the benefits that new network technologies promise to educational researchers, to teachers, and to democratic society.

Evaluation of TeleLearning-NCE

At the final TL•NCE conference, I convened a panel session entitled "What do we know about TeleLearning and how do we know it?" In this session we explored techniques for evaluating the results, quality, and efficacy of our research programs. Based on comments from the audience, I was struck by how little systematic evaluation had been done of the individual projects and of the whole TeleLearning project. Evaluation refers to the act of comparing a unit, course, or program against some set of performance or outcome criteria. These criteria are often set by external agents or organizations, but the interest of the researchers, partners, and the sponsoring organizations are certainly other driving forces in evaluation practice. Comprehensive evaluation includes measures of satisfaction, valuing of outputs, cost analysis, cost benefits, and other criteria of program accomplishment as defined by any or all of the relevant stakeholders or participants.

TL•NCE was privately evaluated by a team of funding council appointees at its mid-term review and more extensively in its ultimately unsuccessful bid for re-funding for a second seven-year term of operation. I was not privy to the submission documentation nor to the

deliberations by the review committees, so I am not able to comment on the weaknesses or strengths of the TeleLearning network as documented by the participants or assessed by the reviewers.

Now the TL•NCE Web site (www.telelearn.ca) promises a "retrospective of the legacy of the Network," but currently the only results available are a list of scholarly publications produced by the principal investigators. This listing is long and the titles of the articles interesting and provocative (at least for an educational researcher like myself). However, as is common in many such publications, the articles are nearly all paper-based and most in scholarly journals or books that are accessible only in university research libraries. Dissemination via the Internet, a natural medium for telelearning research, seems to be precluded by copyright restrictions imposed by most journal publishers and acquiesced to by even Tele-Learning researchers. Like most academic publications, the articles are written for an audience of peers, heavily studded with academic references, and written in formal, scholarly language. This Type 1 dissemination process has little effect on teachers, trainers, or industry trying to enhance their telelearning programming.

It strikes me that the TL•NCE would have been greatly enhanced and its contributions made considerably more effective if evaluation of individual projects, themes, and the entire network had been a primary research goal of the network. This type of reflective research would have revealed for the participants themselves and, as important for those outside the inner circle, the variables, their interrelationships, and the results of this innovative form of multidisciplinary educational research.

Beyond TeleLearning-NCE: Future of Funding for Telelearning Research

Ironically, the decision to not support the TeleLearning network for a second term was made within months of the release of *E-learning E-volu-tion in Colleges and Universities*, a report of the Advisory Committee for Online Learning (2001) that was established jointly by the federal government and the Council of Ministers of Education Canada. This report highlighted the strategic importance of online learning for all Canadians and the shortage of funding for necessary applied and basic research relating to e-learning. The report notes that the "Canadian commitment to learning research and development does not measure up" (p. 10). It argued that new research programming is essential and that "this research should be broadly multidisciplinary and issue-orientated as well as problem and results-based" (p. 10). The report also notes that such research will require significant new research investments. It recommends that either a fourth research funding council be established or that new programs in the existing research councils be developed.

Given the intense competition for research funding and the vested interest of many researchers in the existing research council allocations, it is perhaps no surprise that the three existing funding councils did not publicly endorse the creation of yet a fourth competitor for research funds. Yet it is also surprising that there seems to have been no movement either by the funding councils or government to ensure that e-learning research is even maintained at the current level of funding supplied to the TL•NCE—let alone the expansion recommended by the Advisory Council. The Social Science and Humanities Research Council (SSHRC) attempted to meet some of this need by establishing the Initiative for the New Economy (INE). Two of the four themes of the INE program (general new economy issues, management and entrepreneurship, education and lifelong learning) are clearly in the domain of telelearning research. However, a review of the results of the 2001-2002 competition of the INE shows that only two of 56 funded projects dealt directly with e-learning issues. Thus existing programs from

the research councils seem to be failing to respond effectively to the need for enhanced telelearning research.

2002 NCE Funding Competition

In an attempt to acquire new support for research that would apply much of what had been learned in TL•NCE to actual development of educational courses in the broad area of health education, I developed a proposal for the 2002 call for letters of intent to create a new Network of Centres of Excellence. The proposal gathered the resources of seven university development centres (development research) and six centres of expertise in more basic research issues relevant to on-learning learning (instructional design; evaluation and cost effectiveness; content management; repositories, metadata, and educational modeling languages; knowledge management; autonomous agents design and deployment; and communities of use and adoption). CaseNet was designed to include, while transcending, theoretical research and to focus on developmental research (creation of innovative products) while including extensive on-site, multifaceted evaluation of these innovations in e-learning design and deployment.

The competition for the award was intense, with 53 applications, seven of which were funded for full program application, of which two or three will eventually be funded. Of the seven to pass the first hurdle, not one was focused on social science research generally, much less specifically on telelearning related research. The CaseNet proposal I led was certainly not perfect, but its lack of success is symptomatic of a larger problem. The 2002 evaluation report of the Network of Centres of Excellence noted:

> There are a number of problems that currently prevent more Social Sciences and Humanities (SSH)-led networks, and in general it appears that the NCE is not the most appropriate model for SSH researchers to use for creating networks. (Problems include the lack of experience of SSH researchers in running such large networks, and the resulting lack of research focus. In addition, the lack of SSH-based organizations as NCE sponsors; the diffuse nature of receptor organizations; and the difficulty of measuring effects in SSH fields.)

The lack of experience noted is a direct result of lack of opportunity to gain experience (as evidenced by the 2002 results). The lack of NCE sponsors and the diverse and nascent nature of receptor organizations are characteristics of the emerging nature of this strategically critical area of research—and should not be cause for rejection of support. Finally, no scientist would agree that the challenge of measuring key variables is valid reason to forgo critical research. It is apparent is that not one of the existing federal research funding programs is either capable of or interested in meeting the critical need for research noted in the *E-learning E-volution* report.

Future Funding

It seems that the research accomplishments of the TL•NCE were significant judging by the number of peer-reviewed research articles listed in the Telelearning Web site and the quality of many of their sponsored events. Obviously more could have been done and many valuable lessons have been learned, but most distressing is the absence of a clear strategy by the Canadian government and educational researchers for a means to carry on and improve the research started under the TeleLearning NCE. This research needs to have two major foci.

First is an acceleration of transdisciplinary research aimed at furthering our understanding of the deep underlying issues that ground effective telelearning research. These include, but are not limited to, developments in pedagogy such that we come to understand and effectively apply the

appropriate use of information and technology tools in a diverse number of contexts including appropriate use of both face-to-face and e-learning contexts. Cognitive science, sociological, and psychological research studies are needed to understand more effectively how both to teach and to learn in virtual environments and the factors that most affect implementation of these often disruptive technologies.

Also needed is economic- and business-focused research to develop more clearly economic models, business cases, incentives, and appropriate funding formulae for both research endeavors and implementation of telelearning programs. Computer and information science research is needed, especially as relates to telelearning in structured environments where autonomous agents and learner-controlled navigation allow for efficient anytime/anywhere learning that functions with and without human interaction. Research focusing on information and library science that allows the tagging, retrieval, and efficient publication of learning resources and sequences is also critical to effective use and reuse of learning content. All these developments must occur in and be evaluated from a perspective that acknowledges that no single discipline holds either the complete methodology or the theoretical base to resolve the complex issues that accompany effective telelearning research.

The second necessary component of a new research agenda is defined by field trials, development studies, and action research by practitioners, by debate, and by growth of best practices and dissemination vehicles that allow all participants to play an integral role in telelearning research. We need to create a research culture that embraces and values practitioners.

One example on a large scale of this type of blended research is provided by the European 6th Framework program now being started. The
17.5 billion 6th Framework program has allocated 21% of its budget to Information Society Technologies (IST is one of seven "key areas" of research). This includes a broad range of disciplines and technologies including telelearning. The preamble to the description of this theme (European Research News Centre, 2002) states:

> For maximum economic and social impact, research on information society technologies must concentrate on the future so-called convergence generation. This involves integrating network access and interfaces into the everyday environment by making available a multitude of services and applications through easy and "natural" interactions.

Obviously research that focuses on the "everyday environment" must involve those who live and create this environment. The size and focus of this European example illustrates the strategic importance that other advanced nations place on this type of research. Interestingly, we have noted interest by potential European partners in collaborating in the 6th Framework program with Canadian academics. A small seed funding program by the federal government (see Going Global Science and Technology Fund at http://www.infoexport.gc.ca/science/gglobal-en.htm) has been established to part-fund introductory visits and planning. However, participation by Canadians in 6th Framework and most other international collaborations is conditional on funding support from Canadian sources. To date little support from the research councils or the provincial governments, who have direct mandates for education and training, has been provided to meet this need.

Conclusion

It is appropriate to conclude this brief discussion of the TeleLearning-NCE by recognizing the effort of the TL•NCE researchers, the network's directors, administrators, and theme leaders

involved. TL•NCE did succeed in advancing the knowledge of the potential of telelearning during a tumultuous time of rapid technological growth. Its members trained numerous graduate students in telelearning as a field of endeavor and created an unparalleled network of collaborative researchers. Although research funding and research policy continue to evolve slowly, it is this cadre of researchers and developers who will provide ongoing leadership in this area in Canada. The other articles in this special edition document the accomplishments and efforts of these participants in TeleLearning NCE.

It may be true that we have insufficient experience in managing large research initiatives, but the failure of the research councils to renew Telelearning-NCE and the failure to fund any continuation projects or to fund adequately both basic and applied research in this field leaves Canada and its citizens in a vulnerable position. We risk falling far behind other nations in this critically important and strategic area of our personal, community, and economic development.

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