CCLOW's
JANUS PROJECT

Promises and Prospects of the New Learning Technologies for Adult Learning Opportunities for Women

Final draft of a discussion paper prepared for CCLOW
by Jennifer O'Rourke and Linda Schachter
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Executive Summary

Background

The concept of a project to review the potential impact of new learning technologies on women's learning was developed in late 1995 by the Canadian Congress for Learning Opportunities for Women and funded by the Office of Learning Technologies, Human Resources and Development Canada in 1996. The Janus Project consists of two parts. the development of a discussion paper, and a workshop to review the issues related to new learning technologies and women's learning. This discussion paper is designed to identify issues related to new learning technologies and women's learning and to promote discussion of these issues among those concerned with women's learning, including learners, educators, program planners, facilitators, and policy makers.

Overview

The new communications and information technologies are also potentially new learning technologies: if used appropriately in education and training, they offer the prospect of enhanced and more accessible learning for both young and adult learners. These prospects are particularly significant for women, who rely more on flexible arrangements for both formal and non formal learning, such as part time studies, open and distance learning, and community based programs. But all technologies are part of a human organization system and function within that system. For the new communications and information technologies to realize their potential as learning technologies they must be able to be designed and used in a way that is appropriate to the context and learning goals and complementary to the human dynamic essential to teaching and learning. This paper, then, considers the potential of new learning technologies in terms of context, learning goals and the human dynamics of teaching and learning, particularly as these relate to women's learning.

The study entailed an exploration of the literature on technology and learning and discussions with those directly involved in women's learning. Key issues that emerged were access, cost and use of resources, quality and equality of learning, and opportunities that demonstrate the potential of some of the new technologies for women's learning. As well. throughout the study process, many expressed the need for strategies to examine issues related to technology. The tools and strategies section includes questions that emerged and strategies that were suggested for considering the potential impact of technology-related decisions.

Access

Improved access to learning is an often-repeated rationale for using new technologies. This section explores existing provisions for providing access to learning in Canada, particularly for women, and compares the potential accessibility of new technologies with what is already in place. Because of the high cost of some of the newer technologies and of the infrastructures required to support them, there is a distinct possibility that there will be those for whom access to learning is more limited than before, unless there are interventions to ensure equity of access. Those most vulnerable to reduced access to learning are people in rural, remote and less populated regions, those with limited money to invest in technology and those whose first language is not English. While these are characteristics of whole populations, the impact on women is potentially much greater because of women's greater reliance on part time, distance and continuing education, where new technologies are being introduced at a significant pace.

Exploring the issue of access entails comparing what is offered by new technologies with what is already available, and watching out for situations in which there is expanded access for some, and more restricted access for others.

Cost

New technologies require investments in communications infrastructure, new expenditures and reallocations of funds and human resources on the part of educational providers, and often, expenditures at the community and personal level for facilities, equipment and software. As well, many of the new technologies entail ongoing operating costs for educators and learners. The issue of cost and use of resources is considered in light of choices, and of values underlying those choices, particularly in the context of reduced funding in the education and human services sectors.

There are implications for quality and access in this changed cost structure. The tendency to recover higher development costs by expanding enrolments can mean reduced student support: selling programs to other providers can result in a poor fit between programs and learners' needs. Unless there are policies to maintain affordability for learners, and educators undertake careful planning and monitor the outcomes of using new technology, learners could face higher costs and less accessibility than they had previously.

Quality and Equality of Teaching and Learning

Educational perspectives that regard learning as a process of human growth rather than as a production system provide the framework for this section. Connectedness is an important value in feminist pedagogy, adult education and distance education, and includes both the social aspect of interaction with other learners and educators, and the ability to link new learning to one's context, prior knowledge and life experience.

Instructors and facilitators play a significant role in establishing the context and climate for connectedness. This principle serves as a point of reference when examining the potential of new technologies to support social learning and integration of knowledge, especially in comparison with using other approaches and technologies to achieve these goals. On the positive side, technologies have the potential to support interaction among learners and instructors or facilitators, in turn developing contact and connectedness. On the other hand technology-related factors that can threaten the climate for learning include disruption of a sense of safety among learners and instructors lack of appropriate technical support for instructors and learners, and an emphasis on perceived economies that denies the essential human aspect of teaching and learning.

The direct experience of learners. instructors and facilitators in using new learning technologies is an important touchstone in exploring issues of quality and equality of learning.

Opportunities for Learning

Examples of the use of technologies for women's learning demonstrate their potential in a variety of contexts and applications. Commentators have observed that women have tended to adapt technologies and use them in ways that were not originally anticipated, and this observation holds true for women's use of learning technologies. The area of non-formal learning provides examples of women using technologies to share information and experience and to develop action strategies based on this cooperatively developed knowledge. As well, there are examples of programs that use women friendly approaches. such as mentoring, to help women learn about the technology itself.

In the field of formal education, e-mail and computer conferencing have been used for cooperative learning. There are also examples of databases in topics as diverse as local oral history or whale behavior that are built up over time by learners' individual and collective contributions, using a variety of technologies.

In the area of non formal learning. there are examples that demonstrate the potential of new technologies for communication among women with shared interests across great distances, nationally and internationally.

These examples demonstrate what can be achieved if the context and conditions are right, and also provide some guidelines for ensuring that proposed uses of technology do represent a genuine improvement over what was previously available.

Tools and Strategies

Any innovation can seem intimidating. The advent of new learning technologies, an Innovation that seems so far reaching yet so closely connected with many aspects of our lives. can be immobilizing if people feel they are not equipped to understand it, much less deal with its implications. But the development and use of technologies is simply the outcome of human decisions, which we are all equipped to understand and question. The tools and strategies for understanding and questioning the decisions underlying technology use were developed from suggestions offered in the course of the study. This compendium is based on feminist approaches to learning about social issues, on grass roots community based education, and on traditions of citizen participation in decision making. It is hoped these ideas will serve as a starting point for further discussion and consideration of new technologies.

It is also hoped that the Janus project's process of research and discussion will stimulate thoughtful approaches to examining new technologies, enable greater understanding of technology related issues and enhance confidence in continuing creative questioning in order to promote the wise use of these tools.

Section One

Introduction

Purpose and Framework

This paper is a first step in the process of exploring the impact of new learning technologies on learning opportunities for women in Canada; a process undertaken by the Canadian Congress for Learning Opportunities for Women (CCLOW).

It takes a questioning stance, exploring underlying values and assumptions as well as current practice. It is designed to promote discussion and reflection, point to areas where there are questions to be considered, and identify issues that seem most important to those who are concerned with women's learning, as educators, learners, facilitators, planners and policy makers.

There are a number of reasons why it is timely to look at the potential impact of new learning technologies on women:

- the recent intense interest in new technologies and their potential for learning.

- the importance for women of opportunities for both formal and non formal learning, especially for those who have not previously had access to formal learning, for those who want to continue their education, for those who rely on mentoring, networking and information sharing to enable them to continue in their work, community or family commitments and for those for whom learning is a passion;

- the prevailing concern among many in the workforce about being able to have income-generating work in the near and longer term future, and the sense that additional learning can be an advantage in the workplace.

In Canada, questions related to education, communications and technology are so bound up with our governance, traditions, culture, geography, and with private and public sector institutions, that it sometimes difficult to address specific issues without unearthing the tap roots of ongoing political, social, and economic debates. However, in order to maintain the focus of this document, references to these broader issues will be as tailored as possible to the questions at hand, recognizing that their extent and complexity goes far beyond the scope of this paper.

What do we mean by new learning technologies?

"Educational technologies are not simply the tools of educators--- although this is a popular misconception, rather, they are the knowledge, values and practices which constitute the development and use of those tools." [1]

The term "new learning technologies" can be defined in a variety of ways. It can be said that there have always been learning technologies--- tools that people use to help in the process of teaching and learning ---books, chalk and board, overhead, and so on. As well, for more than a hundred years, there have been systems in place to help teachers and learners communicate at a distance for instruction and interaction, using print, and later, audiotape, telephone, video. Over the past 25 years, the use of these systems for open and distance education has grown rapidly worldwide to deal with the demand for flexible learning opportunities that accommodate the needs of adult learners. So the use of technologies for learning, whether in face to face or distance education, is in itself not new. So then, what is "new" about the "new learning technologies"?

A Working Definition

In this discussion paper, the concept of the "new" learning technologies encompasses electronic technologies used for enhanced communication and interaction to support learning. These include:

- communications technologies such as videoconferencing and audio conferencing, which although not very new, are being applied in new ways because of technical and social developments and computer based technologies, such as electronic mail, computer conferencing, and

- technologies that provide access to information, such as the Internet and the World Wide Web.

The new learning technologies, like all technologies, are part of a system, as Franklin points out, noting "technology involves organization, procedures, symbols, new words, equations and most of all, a mindset". [2]

In other words, this study will examine not just technologies in isolation, but the ways in which people change or adapt their ways of doing things as part of using technologies.

Opportunities for learning

The concept of "opportunities for learning" is linked to several prevailing beliefs- first, that there should not be barriers that impede people from learning, because learning is such an important attribute of citizenship, and second, that if the opportunity for learning is there, people will take advantage of it.

The first concept has served as the basis for many initiatives to make learning available to people who had been previously excluded for a variety of reasons, ranging from remote location to learning disabilities.

The second concept can be problematic, because there may be different interpretations of what is meant by the opportunity to learn. While some educational providers may take a "build it and they will come" approach, there are situations in which the intended learners do not participate, because it was not what learners wanted or there were barriers the provider did not perceive. Potential and actual learners, rather than educational providers, are in the best position to determine whether or not a situation is a genuine learning opportunity.

A "learning opportunity" can be defined as a situation in which the intended learners are able to participate successfully in a program that meets their learning needs, in a manner that is appropriate to their particular context.

Learning opportunities for women

Only in recent years has there been a growing sense among the Canadian population that the education of girls and women was equally important as the education of boys and men. This means that many adult women did not have opportunities to proceed with their education as young people. Even now, despite several decades of affirmative action and equal opportunity policies, there are continuing situations that result in constraints on womens' education.

For example, it was not until 1981 that the proportion of young women aged 15 to 19 attending school equaled that of young men of the same age, and not until 1991 that the proportion of women aged 20 to 24 attending school equaled that of men of the same age.[3] In Canadian universities, although there are now slightly more female than male undergraduates, there is still a greater proportion of male graduate students in most disciplines, and far more male than female full time tenured faculty. Optimistic estimates are that it will take a generation to change the profile of a male-dominated academia, to warm up "the chilly climate for women" that can still discourage women from pursuing further studies and obtaining equal recognition as teachers and leaders in the academic world.

In the field of technical and vocational training, despite many initiatives to encourage greater participation by women in training for occupations traditionally held by men, there are factors ranging from outright hostility to lack of job opportunities on graduation that have discouraged a significantly greater increase in participation in what are termed "non-traditional" trades.

In addition to these factors related to institutional and social contexts, there are women for whom formal or informal learning was not previously available because of barriers such as those presented by social or economic circumstances, family or work commitments, distance, language, disabilities.

A Working Definition

Learning opportunities for women, in the context of this discussion paper, refers to learning opportunities for several categories of adult women who are beyond the traditional age range of those who continue an uninterrupted education from elementary school to post secondary graduation. These include:

- those whose personal circumstances has precluded the opportunity to pursue learning to attain the educational goals of their choice,
- those for whom institutional and social barriers made learning difficult or impossible, who look to a "second chance" for learning,
- those for whom continuing to learn is an important part of their lives, whether it is non formal learning that supports their work, community or family endeavors, or

"learning for its own sake" that is part of personal development.

For many women, the promise of learning becoming more available, accessible and compatible with their needs and goals is an exciting possibility. This paper explores to what extent new learning technologies can support the realization of this promise and examines some of the factors that can limit these possibilities.

An outline of the methodology

The investigations carried out for preparation of this paper included:

- discussions with individuals concerned with women's learning, from all of Canada's regions, whose experience encompasses a range of formal and non formal education and training: programs for women new to Canada, for aboriginal women, professional women, literacy programs, English as a Second Language programs, workplace training and advocacy training.

- a review of the literature on women and new learning technologies; including print and electronic publications in the fields of distance education, educational technology; critical analyses of the social and economic underpinnings of technology and women's use of technology for learning.

- a review of public policy documents about issues related to technology and learning, such as reports of the Information Highway Advisory Council (IHAC) , and documentation developed by private and public agencies directly involved in communications and information fields, (telephone companies, cable companies, ministries of education).

An overview of the issues

The issues that emerged from the study fall into these general categories, all closely interlinked: access; costs and use of resources; quality and equality of learning; and new opportunities for learning. As well, both the discussions and literature contributed to the development of ideas for tools and strategies for examining and tracking questions related to new learning technologies.

The issues are outlined briefly here, and covered in more detail in separate sections of this paper:

Access

The question of access is explored on a number of levels:

- the national and regional infrastructures that support the use of communications technologies
- the institutional or organizational systems that can support the provision of learning using new technologies:
- the local or community based facilities that enable residents to participate in activities using the new technologies;
- the individual learner's circumstances that determine the extent to which she has access to learning using the new technologies.

The section on access provides an overview of recent developments and proposed strategies for enhancing the communications infrastructure in Canada. It also considers some examples of institutional arrangements and community situations that highlight access issues at these levels, and outlines some factors that affect the individual learners' ability to take advantage of what is offered via new technologies. The section on access also poses questions about what resources are available to whom, and considers how decisions affecting access are made.

Cost and use of resources

The question of costs and use of resources is also explored on a number of levels, parallel to those used for considering access;

- the national and regional levels at which infrastructure investments are made;
- the institutional or organizational levels at which decisions are made about technologies, programs to be offered, and which categories of learners to serve:
- the local or community level where decisions are made about facilities, such as computer access in libraries or a videoconference receive site, and about programs to support the use of technologies for learning;
- the individual learner, who must decide whether to invest in technologies that may allow her greater access to learning, and the cost issues that arise at the personal and family level.

This section also considers choices about the use of resources. For example, it examines how people's time is allocated or reallocated when learning technologies are used and raises questions about where resources come from, both in terms of external funding sources and in terms of other programs that may face reduced funding or staffing because

of investment in learning technologies.

Equality and Quality of Learning

This section explores the question, "how does using new learning technologies affect the quality and on equality of learning?" from the perspective of those most closely involved in women's learning. This discussion addresses the following questions:

- To what extent do technologies enable learning to take place more effectively, accessibly and appropriately, and to what extent do they do this better than the other available alternatives, including other technologies and face to face learning?
- To what extent do new learning technologies lend themselves to the range of learning approaches that support egalitarian learning, such as feminist pedagogies, participatory learning, and adult education practice?
- How well do new learning technologies promote equality of learning, or do they favor some forms of conceptualizing knowledge at the expense of others?
- To what extent do new learning technologies support a full range of types of learning, including cognitive and affective learning and skills development, and how well do they meet the needs of learners' individual learning styles?

This section does **not** undertake specific assessments of particular technologies and their potential applications, because this type of analysis, to be meaningful, must consider the particular context, content and learning strategies. Instead, this section suggests ways of considering issues of appropriateness of technologies for learning tasks and of adapting the broader questions to specific situations.

Opportunities for learning

This section examines the kinds of opportunities for women's learning offered by new learning technologies. Among the many enthusiastic reports about using new technologies for learning, we sought out those that demonstrate genuine, sustainable improvements in accessible learning for women. Many promotional writings about new technologies speculate about future potential. Instead of taking this approach, we look at actual experiences of using new learning technologies to support women's learning. These examples have been provided directly by individuals, and/or from reports prepared by people directly involved in the programs, and they appear to demonstrate particular situations in which technology makes a significant contribution to supporting women's learning.

Direct observation and/or continuing evaluation are some of the best ways of confirming the effectiveness of a particular program or approach, or of determining how well a good example will transplant to another situation. This section includes sample questions that can be used to assess cases presented as good examples and to consider their potential as models for use in other contexts.

Tools and strategies

This section complements each of the previous sections, and can serve as a link between the paper and subsequent discussion and activities. It presents some ideas for strategies that can be used to examine decision making about education, public policy and technical developments, at a variety of levels, as they relate to technology and women's learning. This section's compendium of basic questions about access, cost, and equality and quality of learning can be further developed and modified to address specific situations.

A practical Canadian perspective

There are many possible ways of looking at the issue of women and technology. The research uncovered a spectrum of viewpoints, from those that considered technology as a tool of the dominant sector of society to those that regarded technology as one of the best outcomes of humanity's driving force to change and improve. For us, the approach that seemed most sensible was to consider technology in context, in its habitat, so to speak, of social, cultural, economic and political life and decisions. This is the approach expressed by Ursula Franklin in *The Real World of Technology* , as she describes what it means to define "technology in its various aspects within the context in which they occur":

> ...technology is a multi-faceted entity. It includes activities as well as a body of knowledge, structures as well as the act of structuring. Our language itself is poorly suited to describe the complexity of technological interactions. The interconnectedness of many of those processes, the fact that they are so complexly interrelated, defies our normal push-me-pull-you, cause and consequence metaphors. How does one speak about something that is both fish and water, means as well as end? That's why I think it is better to examine limited settings where one puts technology in context, because context is what matters most.[4]

Many layers of context form the backdrop for this study. The Canadian context is pervasive and influences our perspective. Its elements include challenging weather, great distances spanned by innovative communications, traditions of educational accessibility, respect for diversity, and the struggle to maintain a distinct identity. This paper brings a Canadian perspective to the issue of women and learning technologies, although the research includes women's experience of learning within and outside Canada.

We hope that our exploration of technology in contexts ranging from ABE classrooms to streambeds to boardrooms, and the questions that we present, will prompt readers to consider technologies in their context, and to reflect on how the opportunities presented by new learning technologies can become a reality for women.

Endnotes for Section One

1. Terry Evans and Darryl Nation, Distance Education Futures, Selected papers from the 11th Biennial Forum of the Australian and South Pacific External Studies Association, 1993.

2. Ursula Franklin, The Real World of Technology, CBC Massey Lectures, Anansi/CBC, Toronto, 1990, p. 12

3. Josée Normand, Education of Women In Canada, Canadian Social Trends, Winter 1995, p. 20

4. Ursula Franklin, The Real World of Technology, CBC Massey Lectures, Anansi /CBC, Toronto, 1990

Section Two

Access: A key issue for women's learning

Overview

Access to learning has a number of dimensions: availability of learning at times and places suitable for the learner (physical access); and conditions that meet learner's needs for appropriate content and a supportive environment (social access). This section will focus primarily on the components of physical access, and consider how new learning technologies link into the access chain, comprised of communications infrastructures, institutional systems, community resources and individual learners. It will consider not just technical systems, but also the expectations and decisions that shape those systems. Cost is closely linked to access: this section briefly notes cost issues discussed in greater depth in the next section.

Social aspects of access considered in this section include institutional initiatives to overcome barriers to learning. Social dimensions are also explored in greater depth in the section on equality and quality of learning.

Key factors that determine whether or not learning is truly accessible are related to geography, communications and transportation systems, social and economic situations, gender and language. This section explores the actual and potential role of various

educational technologies in providing access to learning and addressing these factors.

These are some of the questions explored in this section on access:

- What are our expectations regarding access to education?
- What factors affect women's access to learning?
- What are the layers of access, and how are they linked, from national and regional infrastructures, educational providers, the community to individual learners?
- How do public policy and technical decisions at various levels affect access to learning?
- How can learning technologies, both old and new, improve access?
- What are some important considerations when learning technologies are used to provide access?

Background: What are our expectations regarding access?

As Canadians, we have a particular perspective on access, almost regarding it as one of the essential items of our citizenship. Living in a geographically dispersed and culturally diverse country, we have come to expect that public policy would stipulate some basic standards in access to communication and transportation as a means of allowing citizens to participate in the political, social and economic life of the country. For example, we have come to expect that we can mail a letter anywhere in the country for the same priced stamp, that we will be able to have a telephone at affordable rates, and in most parts of the country, that the road that goes past our house will connect with a network of roads and highways that will take us across Canada. [5]

Our expectations of access to education are equally a part of the rights we expect as citizens. In Canada, the first country in the British Empire to establish public education, the rationale for accessibility has been shaped by several enduring principles. An important one dates back to 1841, when a founder of the Canadian education system, Egerton Ryerson, argued that universal access to education was essential so that Canada would not be "a nation of hewers of wood and drawers of water" [6] - that it be able to take on leadership in the political and economic sphere and not be confined to a colonial and dependent role as shipper of raw materials to Britain and recipient of its manufactured goods. That statement, and Ryerson's vision, is still a guiding rationale for providing access to education - to prepare people to contribute to the political and economic life of the nation.

How have expectations changed?

The benchmark of what constituted an adequate education has shifted over the past 150 years, generally in tandem with the demands of the economic system. (It has rarely been argued that people required more knowledge because of an evident need for more personal growth among the population as a whole.) In the earlier part of this century, in a mixed economy dominated by agriculture, grade school completion was regarded as quite adequate for most people. In the 1950's and 1960's, high school completion became the normal expectation. By the 1990's, there were often repeated statements that the new "information economy" required at least 17 years of education. It is not the purpose here to argue With this rationale, but merely to note these prevailing assumptions- that the purpose of education is to prepare people to be part of the workforce, and that increased levels of education provide better preparation for this role.

Access and barriers: the question from two sides

The factors that affect access to learning can be considered from two different sides, depending on one's viewpoint. Lack of access can be regarded as a barrier that is a result of a fault in the system, or as problem that is due to a deficit in the learner.

How the same issue is regarded affects notions of responsibility about how it should be addressed: it can be regarded as the system's responsibility to fix the fault that presents the barrier, or as the learner's responsibility to overcome the deficit that makes learning inaccessible.

For example, post secondary institutions have fairly recently established policies and advocacy offices for learners with disabilities. Previously, it was often regarded as the learners' responsibility to find ways of getting around a campus in a wheelchair, despite barriers presented by stairs, heavy doors, inaccessible washrooms and so on. Now, it is an institutional responsibility to provide accessibility and to change structures that present barriers to people in wheelchairs. This is an example of two relatively recent changes: an expanded general concept of what is meant by accessibility, and a shift in responsibility to the institution for providing access by removing barriers to the learner.

Greater awareness of the "two-sidedness" of access can make it easier to recognize strategies to reduce expectations around access and/or shift more responsibility for access to learners. For example, if learners must have Internet access to contact their instructor, when they could previously telephone a 1-800 number, this shifts more responsibility for access to the learner. Learners without Internet access would see this as an institutional barrier, but the institution may see it as a challenge the learner must address.

Factors affecting access for women

Women's access to learning is constrained by limited time availability, due to family and work commitments, and in many cases, by social expectations and limited finances. For many, distance

from educational providers and lack of local availability of appropriate programs are barriers, because women typically are less able to move to or travel to locations where programs are available. Limitations in previous education can also present challenges, notably in language. math and science.

In many cases, the job market rationale for education traditionally supported differential expectations of access to education for women, whose education would be "wasted" if they opted to raise a family instead of joining the workforce. We probably all know families that invested heavily in their sons' education and encouraged their daughters to finish their formal studies quickly, preferably acquiring useful skills, like typing, or training in nursing or education, so they would have "something to fall back on" in the event that marriage did not provide lifetime economic security.

In addition to these women seeking a "second chance" at learning, there are others who want to pursue further qualifications and/or obtain job related skills: and those who regard non formal learning as a lifeline when dealing with personal, social and community issues. For all of them, access is an important consideration.

Women's access to learning through part time and flexible programs

Many women accommodate learning with the other demands of their lives by taking advantage of the more flexible arrangements offered by part time, open and distance education. For example, Statistics Canada reports that at the university level, almost 200,000 women were attending university part time in 1992-93, accounting for 63% of part time undergraduates. Moreover, 60% of women students aged 25 to 29 were part time learners, and 87% of women students aged 40 to 44 studied part time.[7] As well, women account for between 60 and 70% of the 400,000 distance learners in Canada.

At present, it does not appear that the new technologies play a major role in providing access for distance learners. In 1994, only 19% of the 400,000 distance learners were using an information technology-based medium, such as teleconferencing, the Internet, or multi- media, which means the majority were using print, video and audio materials and telephone communication.[8]

Women's high usage of part time and flexible learning demonstrates that many women clearly need this flexibility of time and/or place for learning. Many educational providers that offer these flexible arrangements are now exploring the use of new learning technologies, and, in some cases, there is special funding for their use in pilot projects, while there are cuts to funding elsewhere. This raises the possibility that the use of new learning technologies, because of limited availability, high cost, or displacement of more flexible programs, could in fact reduce access to learning for a significant proportion of those who are most dependent on part time and flexible programs, particularly women.

Expectations of the educator in providing access

Another expectation that has shaped our understanding of access is that the educational provider has some responsibility in reaching out to provide access, especially to learners in remote areas. As a result of this principle, in the early part of this century, many provincial education departments set up correspondence education systems to enable children to complete their learning at home. Many of these programs are still going strong, serving younger students in remote areas, those who choose to study at home, and, increasingly, providing a "second chance" option for adult learners who want to complete elementary or secondary school programs.

This principle of the educator taking the initiative to reach the learner goes beyond the level of compulsory education. Universities with a mandate to serve an entire province, such as the University of Saskatchewan and the University of Alberta, set up programs in their early years to provide access both to formal and non formal learning. The University of Saskatchewan, for example, took The Good Farming Train to railway sidings in each community, providing nonformal education in farming practice and home economics.

In the area of formal education, a number of post secondary institutions offered courses by correspondence, in which learners followed a written program of studies and communicated with their instructor by letter. These programs were often the only option for learners, because of remoteness, disability, lack of funds, or family commitments, and no doubt were challenging and often isolating experiences for individual learners. Nonetheless, many people successfully completed their qualifications in this way.

Many of the early correspondence programs provided a basis for expanded developments in distance education. In recent decades, systems were enhanced by improved materials, more learner support, and use of a broader range of instructional approaches and media.

Issues emerging from the educator's role in access

It seems reasonable to expect that new technologies and systems should not provide less access than those already in place to provide flexible access to learners in many parts of Canada. In a sense, the old systems can serve as a benchmark for the new ones.

Although there is a tradition of educational providers taking a certain responsibility for providing access to learners (albeit within the providers' concept of access), a number of factors, including changing financial arrangements, are increasing the pressure on institutions to manage expectations around accessibility. Later in this section, we will consider how institutional policies around access and new learning technologies interact to redefine what is meant by access.

The components of access

The access chain

The systems that affect access to learning can be considered as links in a chain, with the proverbial caveat that the system is only as strong as its weakest link.

Elements of the infrastructure systems that affect access to learning are outlined below. These systems are quite complex, but basic explanations of the various players' roles, including those "behind the scenes", are needed in order to understand how their decisions affect educational access.

The four levels of access

Let us begin the tour with a fairly familiar example. Canadian educators have been using print based correspondence courses since shortly after a postal system was established. This example demonstrates an important structural feature of access provision: that four levels of systems must function effectively in order to have genuine accessibility: national infrastructure, educational provider, community, and the individual.

In this case, there needs to be a reliable postal system (the infrastructure level): an educational provider willing to offer a course by correspondence (the institutional level): reasonable access to a post office for the learner (the community level): and a learner whose situation permits enough time to study, light to read by, and so on (the individual level). Whether learning opportunities are provided using some of these "old" technologies or much newer technologies, these four levels continue to be significant for considering access.

Considering each of these levels in turn, we can examine how each of them relates with learning technologies, old and new.

The infrastructure

The basic transportation and communication infrastructures established during the past century are still factors in access to learning, as well as to many other services. For example, those who travel to class depend on reliable transportation, whether by private car or public systems, and conditions that permit safe travel in most weather, such as well maintained roads, Those that study at a distance rely on postal or courier systems to deliver materials intact and on time, and on the telephone system to contact their instructor, the library, the bookstore and other learners.

Newer learning technologies require more from the infrastructure. For example, while the use of audio conferencing to transmit voices requires only one regular telephone line, the addition of computer generated graphics requires the addition of one or more lines, or

more "bandwidth" on a telephone transmission system.

Bandwidth: An Explanation

Because the concept of bandwidth is quite significant to this discussion, here is a brief explanation, from A. W. Bates:

> The more information that has to be transmitted, the more capacity or bandwidth is required. One analogy is to think of messages as tiny collections of sand, or "bits" of information. If a bit of information has to be sent quickly, a wide "pipe" is required. The same amount of information can be sent through a thinner "pipe" more slowly. Thus, telecommunications capacity is a combination of bandwidth and speed of transmission.
>
> The bandwidth required depends on the application. Thus, data, such as letters or numbers, which singly do not carry a great deal of information, can be sent using a narrow bandwidth and at relatively slow speeds. Sounds, such as speech on the phone, contain more information than the printed word, and have to be carried as the same speed as normal speech for a conversation to be possible. A photograph or image can also be digitized, and carries more information than a page of text... Colour requires a great deal more bandwidth than black and white images. The greater the amount of information, and the faster it needs to be sent, the greater the bandwidth required. [9]

Many of the newer technologies require a significant amount of bandwidth. For example, most videoconferencing requires transmission lines with significantly more capacity than an ordinary telephone line, depending on the system and the quality of the image being transmitted. As well, computer-based material that has extensive graphics and complex structures, such as much of the material on the World Wide Web, can take a significant time to transmit, depending on capacity of all the systems involved, from the telephone system to the Internet provider's system, to the modem and line capacity of the user.

The technological infrastructure

As part of a range of national initiatives to support the expanded use of what are termed the "new information technologies" both government and private sector agencies have made commitments to enhance the communications infrastructure so that it has the capacity to support what is generally termed "broadband access." Since the Canadian communications infrastructure comprises a complex set of systems entailing networks of land lines that carry phone and cable signals, satellite transmission of data, voice and broadcast signals, high powered transmitters, and short wave, this endeavor represents a complex interconnection of both private and public sector agencies. One of the major players. Stentor, the alliance of major Canadian telephone companies, has announced that it plans to spend from $8-10 billion to provide broadband access to 80% to 90% of businesses and homes by 2005.

This is a formidable task. However, it may be useful to take a step back and examine what is actually available now in terms of basic telephone service to Canadians, look at what will be available in the near future and what it will cost the user, and consider the implications for learning technologies that require various levels of telephone access.

Telephone systems

According to a report prepared for the Information Highway Advisory Council,[10] 95% of Canadians have telephone service, but as of August, 1994, about 275,000 households had only party line service. Other reports indicate that those without phones tend to be in more remote areas. Those that want to use a computer for communication and exchange of information must have access to a private telephone line. The only region where all subscribers have private lines is Saskatchewan, where SaskTel now provides single line service to all its customers [11], and Manitoba Tel planned to convert all party lines to single lines by 1996. [12]

There are still regions of the country where there is no basic telephone access, and other areas where there is no access that would enable the use of a computer for communication or transfer of information. And while 80% of the country may eventually obtain broadband access, it is worthwhile to examine which regions will obtain access first, and to find out about the 20% that appear to be left out of the plan. To do this, we also need to take a very quick look at what is called the "regulatory framework", that is, at the set of rules and regulations that govern what the telephone, cable and broadcasting systems can and cannot do, and these are largely set by the Canadian Radio-Television and Telecommunications Commission (the CRTC).

The CRTC

While the federal government articulates communications policy, the CRTC sets up the rules and regulations that carry out this policy. Until the fairly recent past, the general direction of policy had been to address Canada's vast geography by distributing some of

the costs of communication to more remote regions throughout the system as a whole, so that more remote areas did not bear the brunt of the entire cost of serving that area. However, with the advent of deregulation and of new communications providers, especially of long distance services, there has been a shift both in policy and in regulation towards more "cost recovery" on each kind of service. This means that the cost of communication is likely to be higher in more remote or less populated areas, and, as well, that the cost of local service will also increase, since telephone companies argue that revenues from long distance have subsidized local service.

Issues related to infrastructure

In terms of the communications infrastructure to support new learning technologies, one issue is that those who live in urban areas are going to have access to the broadband systems first, because their larger populations are most likely to provide a return on investment, and those in more remote or less populated areas will receive this service much later or not at all, or at a cost that will be far greater than that paid by urban residents. As one example, BC Tel quotes charges for the broadband system known as ISDN as follows: for those within 4 km of a BC Tel central office, $55 monthly charge, and a $60 one time installation charge: for those beyond 4 km of a BC Tel office, a $75 monthly charge and a $100 one time installation charge. [13] This compares to a current monthly basic phone rate of about $16 to $22.

While these infrastructure developments are proposed as a means of providing greater access to new technologies, in fact the impact may be to limit access to learning using these technologies if this enhanced service is not universally available or affordable. Educational providers also face this question as they consider the use of various technologies and the learners they intend to reach.

One of the other parts of the infrastructure system that deserves mention is the electrical power system, which, while it may be taken for granted in many urban areas, can be unreliable in parts of the country. Virtually all the new learning technologies require reliable and consistent electrical power.

Institutional and organizational systems

Educational systems to provide physical access to learning pick up where the basic infrastructure systems leave off. For example, learners taking part in on-site programs expect a safe location and reasonable access from the parking lot or bus stop to the classroom, and distance learners expect the institution to provide them with the materials and support they need to be successful in their studies.

Learners also expect educational providers to address some of the basics of social access. They expect to be able to contact registration and counselling staff and instructors in person or over the phone. Moreover, they expect that the learning environment will be hospitable, support their needs as individual learners, provide relevant and appropriate education or training, present a reasonable challenge, and offer fair and equitable assessment of their learning achievements.

Distance education experience demonstrates that provision of access is far more than "delivery of information". The quality of the teaching/learning interaction among learners and instructors or facilitators, access to library and other resources, assistance with study skills, and access to academic and personal counseling are essential for a successful learning experience.

Addressing social barriers to learning

As mentioned above, many Canadian educational institutions have a tradition of taking the initiative in providing physical access to learning. This practice is complemented by organizational strategies to help overcome social barriers to learning.

Many people may have had limited opportunities to learn earlier in their lives, due to social factors such as gender, income, class, race, language. A number of educational providers offer either mainstream or special programs to serve those whose access to learning has been constrained by social barriers. Some institutions work closely with groups of learners and their communities to develop programs that are appropriate to their needs. One administrator emphasizes, "they're our students and we want them to be successful."

Customizing programs to learner needs

The success of customized programs offered by Canadian education institutions for learners facing social barriers reinforces the principle that providing access means more than simply providing a course or a place: it also entails offering services to students that help them achieve success. These include academic and personal counseling, community based support systems and prior learning assessment, in which learners can obtain an evaluation of previous formal and non formal learning achievements. These systems rely far more on committed and competent staff than on technology.

Addressing social barriers requires more than technology

As Dr. Ross Paul, president of Laurentian University, comments:

The lesson seems increasingly to be that a majority of students served by open universities are more interdependent than independent, and that the institutions have a tremendous responsibility to take this into account in the design and development of their course delivery systems... The only appropriate response is a fully developed program aimed at the specific needs of a specific target group, and one which is fully integrated into the educational institution. Even at the most basic levels, not considering much deeper issues of curriculum and knowledge control, this is a considerable challenge.. .

If institutions.. are to be more successful in the future in attracting and keeping disadvantaged students, they must emphasize practical solutions to overcoming barriers to learning faced by specific populations, rather than attempt to apply a fixed technological solution to every problem ...This demands an institution that is flexible, open and forever requisitioning the way it operates. An open university will not live up to its name very long if it institutionalizes its technology-- if, as is so often the case, its way of doing things becomes as rigidly applied as traditional classroom teaching.[14]

Reconciling accessibility, budgets and technology

The question arises about how educational providers can reconcile commitments to provide genuine access, and the level of customization and support that this requires, with both the climate of cutbacks and the structural demands of new learning technologies.

While some new learning technologies offer the potential for increased interaction and flexibility for learners, virtually all new technologies require increased investment in staff time. For example, computer conferencing can be used for ongoing discussions that can enable learners to build on each others' knowledge and experience. But this medium also requires significant amounts of staff time to structure and facilitate the conference, as well as an investment by learners in access to the technology. If this technology is introduced to save time and money, it may be disappointing on that score.

The challenge at the institutional level is how to take advantage of new technologies without sacrificing the interests of those whom it has traditionally sieved. While some may make special provisions to ensure technologies are available, others may find it difficult to maintain existing, accessible programs and meet the staffing and budget requirements of new technologies. Some institutions may resolve this by deciding to serve only those who have access to the new technologies.

There is a risk that there will be "have" and "have not" learners, and "have" and "have not" educational providers, in terms of those that can afford and use new learning technologies and those that cannot. For example, voluntary and community organizations operating on

minimal budgets may find many technologies beyond reach.

While many educational providers are investing in new technologies, a number of questions remain about how these are to be used and whether they will improve genuine accessibility in the long run. Here are some specific questions that can be addressed to these providers:

- Who will have access to programs offered by this technology, and how does that compare with who had access to these programs before this technology was introduced, in terms of numbers, gender ratio, location, financial requirements, and so on?

- What has been invested in this technology, and how will this cost be covered- by sponsors, by learners, or by the institution?

- If learners are required to have access to a particular technology in order to take a course or program, how can they gain access to this technology and to training in how to use it?

- As an educator, what support is available to help me learn to use this technology for instructional purposes?

- What is the total investment in computers and software at this institution? What is the investment in part time instructional staff?

Community level access

Continuing along the access chain, local communities have two linkages; to infrastructures, such as communications systems; and to educational providers beyond the community, which may use community facilities as venues to deliver programs locally. As well, larger communities with their own educational institutions may serve as a hub for smaller communities.

Some issues related to community access to advanced communications systems have already been noted. The concept of community learning facilities and how they are changing as a result of new learning technologies, is explored below.

Community learning facilities

The idea of a community facility that serves as a venue for a variety of learning programs offered by a number of different educational providers, distant and/or local, is one that has been introduced, with varying degrees of success, in Newfoundland, New Brunswick, Quebec, Ontario Saskatchewan, and British Columbia. As well, northern communities in

the territories are developing learning sites, and various networks of learning sites are being set up in aboriginal communities. How well community facilities are used, and by whom, and to what extent they meet the needs of learners, depends on a complex array of factors ranging from internal community politics to the location of the building where they are housed.

At the community level, there is a possibility that technology needs will increase over time. In the 1980's, when Contact North[15] began, basic equipment for the first learning sites comprised audio conference equipment, fax machines, and a computer for the local site facilitator. Now, most Contact North community learning facilities have conferencing equipment, (audio graphics and/or videoconferencing) and computers that can provide learners with Internet access.

There is also the question of how many sites are enough to meet local needs, and which communities receive which type of service. A case in point: learners in one major prairie city traveled 200 km, once a week in winter conditions to reach the location of a videoconference class being delivered from a third prairie city, because the program was delivered to very few sites. The example raises the question of why the learners' home city of 60,000 people would not have community site access to videoconferencing. (Another question is whether the learners, if asked, might have preferred local access to audio conferencing rather than driving that distance to obtain access to videoconferencing.)

New technologies and community access

With the advent of SchoolNet, the federally initiated program to link all schools and libraries to the Internet by 1998, there is increasing interest in having public access to this system available locally in more and more communities.

Local libraries or local schools may agree to offer access to the public, but there must still be sufficient resources available to provide a reasonable number of well equipped computers and staff (volunteer or paid) to help train learners in using the systems. Another initiative, supported by Industry Canada, is the Community Access Program, in which communities submit applications for up to $30,000 in funding to establish a community access facility that enables residents to use computers with Internet access. However, the emphasis of CAP appears to be more on business related uses of the Internet than on its use for adult learning. As well, CAP's information materials and application process make no mention of access issues for any equity groups.

In either situation, simply having equipment available is just the first step. It may take a concerted effort by learners and facilitators to make sure a community facility provides access to learning and offers the privacy and uninterrupted use of equipment that learners need. As well, learners need to be able to become familiar with the technology. Training in computer use works best when it is adaptable to the needs of the learners, rather than a "one size fits all" approach. Women have reported they feel more comfortable when working with other women, and when having an opportunity to explore for themselves

how a system works rather than simply be given directions.

Local Internet access

Another technical aspect of access relevant at the community level is that of Internet service provision. An Internet service provider (ISP) maintains the linking systems (computers, phone lines and software) that serve as the bridge between the individual computer users' modem and tile network of networks that is termed the Internet. Although there are increasing numbers of cooperative, public and private ISP enterprises, access to the Internet is by no means ubiquitous in Canada. Those who have no local ISP have to dial long distance to reach one, which can be very costly.

Although many ISP's are at present small enterprises, there are predictions that they could be amalgamated into much larger corporations, much as local cable companies merged into large companies during the past two decades. The advent of local monopolies in Internet access may have the outcome of increasing costs to the user, thus limiting access.

There is also a question about what type of Internet people will be able to access in the future. Plans are well underway for academic institutions, the original main users of the Internet, to withdraw from this system and set up their own Internet, (dubbed Internet II), possibly leaving behind the increasingly commercialized supermarket of infomercials that bulk up the World Wide Web.[16] It is not possible to determine what this will mean for access to learning opportunities via the Internet, but it seems likely to complicate the situation for learners for some time to come.

Women's Internet communities

One interesting example of using Internet access for non formal learning is that of women's communities established on the Internet. These provide a supportive atmosphere for women new to computers and the Internet, through both local and "virtual" communities, where women are in communication in person and/or by computer.[17] They represent considerable potential for providing women with access to the type of nonformal learning that occurs through interaction and exchange in a supportive environment.

Personal access

At present, there are many formal and nonformal education and training programs offered on more flexible basis to meet the needs of adult learners, particularly of women. They include a broad range: literacy and ESL programs offered by community based agencies, skill and interest courses offered by colleges and school boards, workplace based training offered by employers, open and flexible learning programs that enable learners to "drop in" on their own time and work with resource materials, and distance education programs that provide courses or complete programs to learners who study independently and/ or in

groups. The current programs provide a benchmark for determining to what extent new technologies improve accessibility.

From the learner's perspective, factors that affect access to learning opportunities emerge from the following series of questions:

- What learning do I want to pursue?
- Is it available in my community, at a time and place that make it possible for me to participate?
- Is it available to me by distance education, in a format that makes it possible for me to use?
- Can I afford it?
- Do I have the time to do this? If there are competing demands of family or work, will be able to negotiate sufficient time?
- Are there other factors, such as my previous education, or language, that affect my eligibility or ability to participate?
- Will the learning program be set up in such a way that it meets my needs as a learner?

While learning technologies, old and new, can help with some personal access issues, such as the need to study on a flexible schedule, they cannot necessarily help with others, such as limited finances or insufficient time to study. Lack of confidence or an unsupportive family are barriers to learning that need to be addressed with the help of human support, rather than new learning technologies.

In some situations, newer learning technologies can make personal access more complicated. Two examples follow.

Access to systems and technologies

As mentioned earlier, access to single telephone lines and reliable electrical power is not necessarily a given for a significant number of Canadian households. These are the most basic requirements for communication. Access to computers cannot be assumed. In many locations, if computers are available in public facilities, they may not have the systems needed for communication or for Internet access. Computers are a costly item, and tend to be more available in wealthier households.[18] (See the background data below.)

Language issues

Language is a major consideration as soon as communication over the Internet is required, English is the dominant language of the Internet and of many communication systems,

such as e-mail: other languages do not travel well on the Information Highway. One report prepared for IHAC notes that text based messaging and other software do not readily accommodate languages other than English, and that written material in aboriginal languages cannot be readily exchanged over electronic networks, since their scripts cannot be written in digital code used by most computers and networks.[19]

Even Canada's official language, French, is not well supported on the Information Highway. The final report of IHAC comments that "the availability of French language materials, navigational tools and compatible standards for their distribution is very limited and must be encouraged."[20]

Background data: Who has access to technology?

In this section we attempt to provide a brief sketch or statistical overview of the extent to which Canadians use and/or have access, both at home and at work, to computer technology and other technologies that affect access to learning directly and indirectly. Where possible we have reported these data for women: where these data were not readily available due to time and cost factors delimiting this study, we have tried to extrapolate possible implications for women given other known data. Our analysis has focused on computer access and use and related information on learning.

Who has computers?

According to the Statistics Canada Household and Facilities Survey 1996, of the approximately 11.4 million Canadian households, some 3.6 million or 31.6% have a home computer, up over 10% from the previous year.

Not surprisingly, data show that those with higher incomes are more likely to have computers.

Comparisons with the 1994 survey indicate that percentages of households with computers are increasing, at both higher and lower income levels.

By 1995, the data show increases in computer ownership in both higher and lower income levels; 53% of those with incomes over $70,000 and 11% in households with incomes under $15,000; in the 1994 survey, over 45% of the highest income households had home computers compared to 9% of households with lower incomes.

Interestingly, families with children are also more likely to own computers (35%), as compared to families without children (25%) or one person households (12%). (1994 Household survey) Although this data is not broken down by women led households, data for lone parent families (1995 Household survey) can serve as a proxy. In 1995, only 22% of lone parent families with children under 18 had a home computer; whereas 44% of

single family households reported computer ownership. [21] The proportion of households with home computers varies across the country. For example, in Alberta and British Columbia, 38% of the households have home computers; in Newfoundland and New Brunswick, the figure is 22%.

Who has Internet access?

About half of computer owners also have a modem, the linking equipment that is required for access to the system of computer networks known as the Internet, but the minority of these households also have Internet access.

In the 1.8 million households with computers equipped with a modem only about one quarter actually access the Internet at home.

Who uses online services?

In the 1994 Household and Facilities Survey, of the people with home computers, 22% of men and 14% of women reported that they had used online services.

Use of online services translated into increased number of hours of computer use for both women and men although women report using the computer fewer hours than men. For those using online services the average number of hours of home computer use was nine hours per week for men (compared to six hours for men without online services) and seven hours per week for women (compared to five hours for those without online hook-up).

(More households in Alberta and British Columbia access the Internet than do Canadians on average, 10% as compared to 7.4%).

Who uses computers at work?

As many of our respondents noted, it was through work that many people first begin using a computer.

The 1994 Statistics Canada General Social Survey, reports that almost 48% of Canadians use computers in the workplace, up almost 15% from 1989.

At work, more women (52%) than men (44%) reported that they used computers at work. The higher use of computers by women reflects their concentration in clerical occupations.

Statistics Canada defines high computer use occupations as occupations where over 60% of the workforce reported using computers at work.

For women in high computer use occupations, the top four occupational categories were management/administration (28%); library/clerical (25%); bookkeeping/accounting (15%); teaching (14%): and other (18%).

For men in the high use category, the occupational breakdown is management/administration (48%): teaching (10%): architecture (8%); life sciences/ mathematics/systems analysis (7%): electronic data processing (6%): and other (21%).

These data are compatible with what we know about women's' occupational segregation.

Education and computer use

For both women and men computer use at work increases with educational attainment; about 70% of those with a university degree reported using computers at work.

Computer use at work is high among educators, although women educators are less likely than their male counterparts to use computers at work.

For example, 89% of male elementary and secondary teachers report computer use at work compared to 61% of female teachers in this category.

In the area of advanced computer skills, for example using computers for data analysis, 46% of male teachers and 26% of female teachers have used these skills to analyze data.

When asked about using online services at work 41% of the male teachers as compared with 15% of the female teachers, reported engaging in this activity at work.

It is likely that these figures reflect the distribution of teachers in the elementary and secondary school panels as well as the lower representation of women in school administration.

Women's access to computers

Although there has been a large increase in the use of computers, both at home and at work in the last ten years, access of women to new computer technologies still lags behind men in many important areas. Women's access to the new technologies is a product of the social forces that affect educational choices, labor force participation, occupational segregation and relatedly, income levels and family patterns.

Household access to other technologies

Access to other communication technologies is also reported in the Household and Facilities Survey. Data from the 1994 survey show 400,000 Canadian households with a fax machine and 75% of Canadian households With cable service. In 1993, Statistics Canada reported that 3% of Canadian households had a satellite dish.

Some questions about access

From the perspective of those concerned about access to learning for women, there are some specific questions that can be addressed to decision makers, in the community, in educational institutions, and at provincial and national levels.

- What do I consider good access to learning opportunities? How does that compare with what is available in my community?
- How well are proposed community access learning centers, whether provided by local or provincial agencies, or through SchoolNet, Community Access Programs, serving adult women learners?
- Who is getting access to the Internet in my community? Are there age and gender statistics?
- What training is available for users of the local community learning centre or access centre, and how accessible and friendly is it for women learners?
- How does this type of access to learning that is now available in my community compare With what has been in place? For example, are technologies being used to replace on site classes, or are they providing learning opportunities that weren't available before?
- What do I need to invest personally, in time and money, in order to obtain access to the type of learning that meets my needs? Does this type of learning require using new learning technologies? old learning technologies?
- What plans are in place to provide broadband telephone access to my community? What will it cost the user when it is in place?

End Notes for Section Two

5. (Interestingly, each of these expectations has been challenged recently- reports on Canada Post argue It is not economically rational to provide first class postal service anywhere in Canada for the same cost; CRTC regulations now support cost recovery on separate elements of telephone service (a process termed unbundling of rates); and toll roads are becoming a more popular way of covering highway costs.)

6. Speech on the occasion of the opening of Victoria College, Cobourg, later Victoria University, part of the University of Toronto.

7. Josée Normand, Education of Women in Canada, Canadian Social Trends, p. 19.20

8. Jeffrey Frank, Access to Technology in Canada, Canadian Social Trends, p. 7

9. A.W. Bates, Technology, Open Learning and Distance Education, Rutledge, 1995. p. 89

10. Access, Affordability and Universal Service on the Canadian Information Highway:, report prepared for IHAC, 1994.

11. ibid, p. 8

12. Interestingly, SaskTel and Manitoba Tel were the only telephone companies operated as provincial government crown corporations, which may call into question the oft-repeated dictum that the private sector is better equipped to provide services on a businesslike basis, Manitoba Tel was privatized in late 1996.

13. BC Tel website, Nov, 1996.

14. Ross Paul, Access and Equal Opportunities; Strategies to Realize our Pious Aspirations (A Canadian Perspective), proceedings of The Student, the Community and the Curriculum: International Perspectives on Open and Distance Learning, sponsored by UK Open University East Anglia and Empire State College, Sept 1991, p. 213, 215.

15. A provincial initiative to provide greater access to learning for residents of northern Ontario

16. US Universities announce birth of new baby, Internet II, Robert Everett Green, Globe and Mail, Oct, 17, 1996

17. Heather Gordon and Lynn Hauska, Sunshine Coast Women's Centre Online, Women'space, April, 1996 and Women'space is a Canadian-based Virtual network that aims to promote accessibility to the Internet, its tools, information and resources, to enhance the effectiveness through national and global connections.

18. Education Quarterly Review, Statistics Canada, Vol. 3, # 3, p, 18

19. Access, Affordability and Universal Service on the Canadian Information Highway, p. 10

20. Final Report, Information Highway Advisory Committee. p. 63

21. Jeffrey Frank, *Canadian Social Trends*, Autumn 1995

Section Three

Costs and Use of Resources

Overview

This section examines cost questions within a framework of values about learning. There are values underlying funding decisions, and this section begins by exploring some of the basic principles of educational funding in Canada, especially funding for adult education and training. The impact of new learning technologies is considered within the context of a shifting pattern of funding for education and training.

Costs involved in new learning technologies are considered at the levels of infrastructure, educational providers, the community and the individual. Most new learning technologies depend on infrastructure developments in advanced communications systems. For educational providers, the use of learning technologies can mean changed cost structures and funding priorities: this section explores some potential outcomes of these changes. We also consider the implications of costs of the new learning technologies for individual learners particularly for women.

These, then are some of the questions considered in this section:

- Who pays for education and training in Canada?
- How has funding for adult education and training changed over recent years, and how has that affected approaches to provision?
- What are the types of costs involved in new learning technologies, at federal and provincial levels, for educational providers, for communities, for individual learners?
- How do these costs compare with costs of "old" technologies or approaches?
- What is the impact of new learning technologies on costs for the learner? What are the implications of this for women?
- How can we compare value and costs of new learning technologies with other approaches?

What this section does not provide is a complete cost picture of new learning technologies. Even If it were possible to develop such a picture, given all the variables and unknowns, it is beyond the scope of this paper to do so. Instead, this section presents some of the types of costs, in terms of money and human resources, for new learning technologies. This approach should make it easier to uncover the underlying values behind financial decisions, and their implications for women's learning.

Values and costs

One problem with considering cost questions is that it is difficult for most people to visualize large sums of money. C. N. Parkinson (of Parkinson's law)[22] commented that most people cannot consider amounts larger than their personal bank balances: for this reason, it usually takes longer for a group of people to discuss the allocation of the coffee fund than to decide on a million dollar expenditure.

A suggested way of approaching cost issues is to convert them into questions about comparative values. For example, when we read that the local school board has invested $500,000 in providing computers for school administrators, we might ask how that compares with the salary of the three special education teachers who have been just declared redundant. In another example of looking at comparative values. Heather Menzies in *Whose Brave New World*, notes that one year's investment in information technology by the federal government would pay an annual salary of $40,000 to 90,000 people.[23] We can think about comparative values by considering what else a certain amount of money could buy, or by comparing costs with alternatives that achieve the same or similar outcomes. This is in contrast to an accounting approach, which sets up different categories for costs for equipment (usually capital costs) and costs for people (usually operating costs) an arrangement that does not readily allow for comparisons based on values.

Background: Who pays for education and training in Canada?

It has been generally accepted in Canada that the cost of educating "the young"- (usually defined as those pursuing elementary and secondary education with their age cohort) should be a public expense shared by all taxpayers, rather the individual financial responsibility of families. The levels of education that are publicly funded have gradually increased along with expectations of what is considered an adequate education, from grade school completion in the 1940's to high school completion in the 1960's.

The population surge of high school graduates in the mid 1960's to mid 1970's, the belief that all academically qualified applicants had a right to post secondary education and the

confidence that further education was a ticket to employability increased the pressure to make college and university education affordable through a systems of grants and loans. At the same time there was an enormous investment in a rapid expansion of the post secondary system across Canada; the number of universities in Canada virtually doubled between the 1950's and 1980's, and a large proportion of the community college system was established.

For the time being, public funding for the expansion of the post secondary system has apparently reached its limits, as federal grants in support of post secondary education have been curtailed over the past decade, making less money available both for maintaining the institutional system and providing financial support for individual students in post secondary education.

The shifting pattern of funding adult education and training

In contrast to a general consensus that the cost of educating the young should be a public expense, there are a range of prevailing beliefs about who should pay for education and training of those who are beyond what is traditionally considered "school age". These programs include what is variously called adult education, continuing education, adult retraining, and adult upgrading. The numbers of people served in these programs are significant: according to Statistics Canada's Adult Education and Training Survey (AETS), about 35% of the Canadian adult population took courses or received training in 1993.[24]

There does not seem to be a general consensus about how the costs of adult education and training should be balanced between society as a whole and the individual learner. To some extent, the response depends on how education is regarded as a personal and economic benefit to the individual, as the right of every citizen, or as a common good for society as a whole.

Continuing education

Until recently, many post secondary institutions had a long-standing tradition that the costs of continuing education were shared between the provider and the learner, on the grounds that it was part of the institution's mission to serve the population whose taxes supported it. But this has changed dramatically over the past ten years, with increasing demands that continuing education programs not only recover direct costs, but also return a profit to the institution. Some continuing educators felt the move towards profit making was a betrayal of public educational institutions' social responsibility; others felt it was a realistic response to a changed funding climate.[25]

In order to increase their revenues, post secondary institutions are increasingly seeking "partnerships" with the private sector, in a variety of arrangements ranging from those in which the institution provides programs customized to meet the training needs of a particular company or industry to those in which the institution obtains special rates for use of a particular corporation's product or service, such as computer software or long

distance telephone access.

Adult education and training

There has also been a mix of approaches to funding in the field of retraining and adult upgrading. In the 1960's and 1970's, there was an increase in government funded retraining and upgrading as part of the rapid expansion of publicly supported community development initiatives. Since then, funding patterns have changed according to the political tenets of the day.

In place of "block funding" which enabled providers to allocate funding according to local priorities, funding has recently tended to be more and more directed into particular types of programs, depending on prevailing beliefs about the value of particular types of training. In some years, funding priorities seemed to stress the importance of basic literacy and numeracy: in others, they supported provision of training in advanced technology in order to meet the anticipated demands of an economic system based on "knowledge workers."

In some sectors, employers have covered or shared with employees the cost of job-related training: there have also been representations from employer groups arguing[26] that the public education system should provide graduates with the skills they need for the workplace.

Funding for new learning technologies

In continuing education, adult education and training, while basic funding has been reduced, there have been increasing emphasis and financial support for the use of new learning

technologies in these contexts. This is sometimes done without necessarily determining the advantages of using technology, and often without setting up any provision for comparison between programs using new learning technologies and those that do not.

Funding for new learning technologies tends to be targeted. What this means is that, in many cases, the first priority of funders is that educational providers use a specific technology; what programs are offered, and to whom, are less important funding factors than the technology to be used.

Levels of cost considerations

In general, there are costs for education and training at several levels:

- macro level costs of building and maintaining an educational system;
- intermediate level costs of operating an educational institution, and of supporting community learning centers and local programs:
- program and course costs - what it costs a particular provider to offering specific programs or courses to specific populations;
- costs to the learner; for fees, materials, travel to an educational institution, and reduced income, if paid employment is curtailed in order to have sufficient time for study.

New learning technologies bring additional categories of costs;

- the cost of national and local infrastructures that support the use of educational technologies, for example, the investment in electronic communications and transmission systems:
- costs to the institution of establishing an institutional infrastructure to use these technologies; for example, costs of equipment acquisition, of system development and training of staff and faculty;
- costs to the institution of developing specific programs and courses using learning technology;
- costs to the institution of delivering specific programs and courses using learning technology:
- costs to the learner, including the cost of obtaining access to these technologies, for example the cost of computers, software, line charges, and so on, and/or the cost of travel to sites where technologies are available.

Some examples of infrastructure costs

It is difficult to estimate the total costs of establishing the infrastructure that supports new technologies, or to determine what proportion of this can be attributed to using new technologies for learning. For example, the Information Highway (the infrastructure, systems and other mechanisms that make it possible provide computer based communication linkages among most places in the country) will be used for a wide range of purposes, including government, business and educational uses, and its development is

being funded by a broad range of public and private sector investments.

The federal government's investment in information technology ($3.1 billion in 1992-93, $3.5 billion in 1993-94, $3.6 billion in 1994-95), [27] would not necessarily all be directed towards the information highway development, but on the other hand, the federal contribution to information highway developments is by no means the total amount of public and private funding that is being invested in this system.

Investments in computer communications

SchoolNet, the computer based communication systems that is expected to be connected to all schools in Canada by 1998, represents an initial investment in the basic system by the federal government, of $52 million over four years, which does not cover any of the costs associated with linking individual schools to the system. In addition, there are investments by the provincial governments in provision of computers in schools and other technological support systems. For example, in British Columbia, the provincial government is investing $100 million over a 5 year period[28] to put more computers and network technology into schools. In New Brunswick, $10,5 million will be invested over a five year period in TeleEducation New Brunswick, of which $6.1 million was allocated to establish and maintain the technological and organizational infrastructure, and $4.4 million was allocated to support up to 50% of the costs of developing courses for distance education. [29]

Investments in telephone systems

Stentor, the alliance of Canada's telephone companies, has announced plans to invest $8-$10 billion in its Beacon Initiative to upgrade local telephone networks so that 80% of telephone subscribers will be able to have access to broadband lines by 2005.[30] Broadband telephone access would support the use of new learning technologies from a given community.

However, priorities for investment in enhanced systems will be based on potential rate of return, CRTC policy now stipulates that rates for specific services to specific regions be set at cost recovery levels, rather than averaging costs over a larger portion of the system. This means, as noted in the section on access, populations that can cover the cost of enhanced service will receive it first, while more remote communities may not receive it at all or face considerably higher costs for the same service, unless specific interventions by government or other agencies subsidize the cost of serving smaller and/ or more remote communities.

Other technology initiatives

CANARIE, the Canadian Network for the Advancement of Research, Industry and Education, a federal/industry coalition to explore potential applications of the new communications and information technologies, projects an investment of about $900 million in public and private sector funds in network upgrading, product development, establishment of a test network, and its own administration. [31]

Who is paying for all this?

These are just some examples of some of the costs associated with building advanced communications systems that can be used for business applications and for learning. In many cases, the public will be paying for these expenditures, whether they are made by the private or public sector, and our share of these costs may show up on our tax bills, phone bills, or cable bills at any time in the near future.

There appears to be no immediate plan on the part of either public or private sectors to ask Canadians whether there is something else we might rather do with the money invested on our behalf in the communications infrastructure. Unlike the concerted public outcry that met the Canadian cable companies' 1995 move to "negative option billing", there has been little public debate about these expenditures.

Institutional costs

It may be somewhat easier to pin down the costs of new learning technologies at the institutional level, because educational providers that use "old" and/or "new" technologies to provide access tend to track their costs quite closely. This means there are some points for comparison in estimating additional costs for new learning technologies.

For example, educational institutions with established distance education programs usually have specific budgets for serving their students using a variety of technologies, including print, audiotape, telephone, teleconferencing, videoconferencing and computer conferencing. A number of internal cost studies have demonstrated that costs for serving students using "older" technologies were equivalent to, and sometimes lower than, the costs for serving on-site students. As well, the costs for providing learning opportunities by distance education are also generally much lower than the costs of providing traveling instructors to offer courses in communities, unless there are special funding arrangements in place and/or costs are shared between the host community and the educational provider.

Some examples of equipment costs

The costs of the newer learning technologies tend to be considerably higher than the costs of technologies used for some years to provide flexible and open learning. For example, real time conferencing allows learners and instructors in different locations to have a direct conversation; in other words, listeners hear the speaker's message at the same time as it is sent, as in a face to face conversation. [32] The capital costs of basic equipment for audio conferencing have been estimated at $5,100 per site, increasing to $10,200 per site for audio graphics. But it costs $20,000 to $30,000 per site for interactive videoconferencing[33] that uses phone lines.

Operating costs

In general, technologies that require real time transmission, especially those such as videoconferencing that require multiple lines or broadband systems, have substantial ongoing costs for transmission, whether over telephone, cable or satellite systems. These costs increase with the numbers of sites served, whether there are two or thirty students at that site. Long distance charges are a significant part of the costs of technology based communications that rely on phone lines, especially those that require broadband to transmit video and computer graphics. Satellite transmission of video entails ongoing costs for the use of satellite time.[34]

For learning technologies that use the phone system, line charges are such a significant cost factor that a consortium representing many Canadian educational institutions presented a brief to the CRTC requesting a change in regulations so that phone companies could set reduced tariffs for educational purposes.[35] Their efforts have not resulted in significant changes in policy. In September 1996, the regulating agency determined that telephone companies could provide reduced rates for educational purposes[36], but stipulated so many conditions that it is doubtful whether any educational institution would be eligible for the reduced tariff.

By contrast, technologies that do not require "real time" interaction may be lower cost in the long run. Computer conferencing, in which messages are sent on a delayed basis, not simultaneously, (this is called "asynchronous" transmission), can be significantly cheaper than audio or videoconferencing. At present, computer based communications systems are generally lower in actual transmission costs, providing the computer user does not have to pay long distance line charges to reach a server (a dial up link into the system), and that there is a local Internet Service Provider (ISP) that charges reasonable rates.

Stuff time

For all institutions that use learning technologies to provide more flexible learning opportunities, the investment in staff time is significant, both for preparing materials, and

for facilitating learning. As well, it takes time for staff to develop expertise in this form of instruction. This is the case for all media, but the investment in time depends on the media used: for example, print and audiotape materials usually take less time to prepare than video or computer based materials. Multimedia materials take a much greater time investment, as do materials designed to be delivered over the World Wide Web. For example, Tony Bates, a recognized expert in the field of educational technology, estimates that preparation time requirement for pre programmed computer based learning is about ten times that needed for print materials.[37]

As noted in the section on access, investing in learner support is essential if the program is to provide access to successful learning. This means allocating staff time for tutoring and counseling as well as instruction or facilitation.

Because of their increased sophistication, most new learning technologies require additional staff training; some require coordination and support from a project manager and technical staff. Sometimes, instructors who pilot educational technologies are released from some of their assigned work to give them extra time to learn the workings of the new system and how it can best be used for teaching and learning. This usually entails additional staffing costs. Nonetheless, instructors who work with new technologies often comment that their investment in time is significantly more than they were officially allocated. [38]

Potential impacts of technology costs on educators

Technology costs can affect the viability of agencies that lack technology and increase pressures for cost recovery for those that do have technologies. Both of these can constrain educational objectives.

For non profit agencies, or agencies that provide learning or training on a cost recovery basis, it may not be feasible to invest in technologies for learning. For example, immigrant serving agencies or literacy providers who typically operate on very limited funds, may not be able to accommodate educational technology at all, much less provide sufficient equipment for their learners to use. This can mean limited or no access to grants that require technology, and/or loss of learners to organizations that can offer access to technology.

Institutions and organizations that have invested in new learning technologies may face higher costs that must be recovered. A number of observers have pointed out that the cost of materials development for the new learning technologies may well be beyond the means of individual public sector institutions, and they will have to seek out partnerships, either among public institutions, or between public institutions and private sector organizations in order to cover the high development costs.[39] This in turn, means that, in

the drive toward cost recovery, there may a tendency to enroll larger numbers of students than the rest of the system can support, in terms of tutoring, study skills and counseling.

Alternatively, institutions may sell courseware to other institutions whose learners mayor may not have the same needs as those for whom the materials were originally designed. For example, a business development program developed for urban learners was subsequently provided on a cost recovery basis to quite a different cohort, women living in northern remote communities. The northern learners had to struggle with material that reflected a very different experience from theirs, in terms of community situations, social expectations, transportation and communication issues and types of businesses they could operate.

Highly visible investments in new technology may overshadow the less visible but essential human interaction involved in tutoring and advising, which cost cutters within an institution may be tempted to see as expendable, rather than an integral part of the learning experience. This view regards learning as tantamount to delivery and receipt of information, rather than as human growth and change.

Community level costs

In many regions of Canada, governments and agencies have initiated establishment of community learning sites. For example, over 20 years ago, Newfoundland set up a system that now has over 200 local centers that can receive teleconferences educational programs, delivered by post secondary institutions, medical educators and school systems. In most cases, governments and agencies external to the community provided funding. Now that there are initiatives by SchoolNet and other programs to establish linkages with the information highway in schools and libraries in many communities in Canada, it seems more likely that community access will depend to a greater extent on community initiative and funding.

There are some implications for both costs and access when funding of community sites shifts to the community. Typically, externally-funded community learning sites were equipped to receive programs offered by particular educational institutions to that location. For example, if a local college provided programs by audio conferencing, community sites would be provided with audio conference equipment. Community initiated access sites may make their own determination about what equipment is needed, and there mayor may not be a match between the equipment at a community site and the equipment required to receive programs offered by a particular institution. Communities are unlikely to invest in equipment and staffing for audio and/or videoconferencing unless educational providers make a commitment to provide programs to that community site. In the climate of budget cuts, institutional program commitments can be fragile, potentially leaving a community without programs and with the cost for unused equipment.

Community access sites that provide basic computer Internet access have costs for space,

computers and software, and paid or volunteer staff to provide training and technical support. Under the Community Access Program (CAP) sponsored by Industry Canada, some funding assistance is available to set up these types of facilities at community sites. However, CAP sites are not specifically designated as learning sites: they are intended to serve a number of purposes, especially local businesses. As well CAP does not require sites to make equal access provisions supporting equitable participation by women, minorities, or disadvantaged groups.

Learner costs

The individual learner also faces costs in using new learning technologies. For audio conferencing and videoconferencing, these may include the costs of traveling to a site that is receiving the program (although learners can participate in some audio-conference programs from home). As noted in the access section, the travel requirement may be significant, especially for videoconference courses, which may be delivered to a limited number of sites because of the cost of equipment.

Individual learners who want to take part in an educational program that includes computer conferencing or the use of the World Wide Web must either have their own computers and software or reliable and regular access to a computer. As well, the computer must have sufficient memory and advanced operating systems to support full use of Internet access and conferencing, and must also have a connection to an Internet service provider.

There are legitimate concerns that the costs for the individual learner can present a barrier to access. Although the number of households with home computers is increasing, there are many for whom the cost of investing $3000 or more in equipment and software makes it an unlikely priority in a time of restricted budgets and uncertain employment.

Comparing learners costs for "new" vs "old" technologies

It is a challenging task to try to estimate the total costs at all levels of using new learning technologies. But it may be useful to consider an example from a learner's perspective.

An individual learner studying in a formal program by distance education, for example a course on health care issues, would pay tuition fees and in some cases, cover the cost of materials. She may have a package of print materials supplemented by a videotape that show various health care scenarios.

She would need access to a VCR to view the videotape. In most cases, she would need access to a typewriter, word processor or computer in order to complete several assignments, but if necessary, could negotiate to submit her assignments in neat handwriting. She would send in her assignments by mail or fax and receive written

feedback from the instructor. She could contact her instructor by phone, in many cases using a 1-800 number. She would also be able to contact the institution's library and order books and resource materials to be sent to her: usually, her cost would be the return postage. In some cases, she may be able to work on projects with other students, using fax and telephone to keep in contact.

Let's see what happens to learner costs when various technologies are added:

- If there are required audio conference sessions, the learner would either have to travel to a site to participate, or negotiate to participate from home, in which case she may have to cover the costs of long distance charges.

- If there are required videoconference sessions, the learner would have to travel to a site where this is available. This means that the learner would need a reliable means of transportation in order to participate in this course, and since the majority of distance courses are offered between September and April, the learner will likely have to travel in winter conditions, requiring more time and money.

- If there is a required computer conference component, the learner would need access to a computer equipped with a modem, communications software and Internet access, on a frequent and consistent basis, since computer conference discussions continue day to day. If the computer conference is a significant part of the course, the learner may find she has to negotiate extensive use of the phone line at home, if she has a computer at home, or even invest in a dedicated phone line for the computer. If the learner is unable to access a computer for a week or more, it may be virtually impossible for her to pick up the thread of the discussion. If her employment requires extensive travel, she may need to purchase a laptop computer and modem, and cover long distance costs to reach her Internet service provider.

- Now suppose this same course is offered as a computer conference multi-media course, in which the materials are provided by access to a specified site on the World Wide Web (available by password provided to learners who register for the course). The learner would need access to a computer with all the equipment and software necessary for World Wide Web access, and sufficient memory to download the course materials.

This example shows how a relatively straightforward and cost effective course, both for the institution and the learner, can become more costly for both when new technologies are added.

Often, the rationale for using the new technologies is the potential for increased interactivity. However, it has been demonstrated that opportunities for interactivity can be provided by much simpler means, such as designing the course in such a way that facilitates group work, and setting up simple arrangements for communication, such as a phone or fax linkages. The question is whether the advantages offered by a specific technology justify the increased cost in money and time for the provider and the learner.

Shifting costs to the learner

In the example provided above, both the institution and the learner incurred higher costs for using newer learning technologies. In other cases, the use of newer technologies tends to shift a greater share of the cost of access to the learner. As mentioned earlier, many institutions that regarded community education as part of their mission also considered the cost of outreach as an institutional cost. But funding cuts and a shift in priorities has prompted a move toward requiring learners to bear more of the costs of access. For example, in some cases, instead of a 1-800 line that students can use to phone their instructor, learners now must cover the cost of computer access so they can contact their instructor by e-mail.

For women, who are the majority of part time learners and of distance learners in Canada, these additional cost requirements may make it impossible to pursue the only form of education that was previously feasible for them. Covering the cost of travel to reach a videoconference site, or of computer access, may just be the element that makes education unaffordable, especially when family budgets are tight and it is difficult to cover the cost of essentials.

What is the evidence of value for money?

Determining the value of any given technology has to be done on the basis of some comparison. Educational technologies, when first introduced, were frequently compared with traditional face to face instruction; comparisons that often ignored the reality that the different techniques were used to serve different cohorts of learners in different contexts with different needs. Now that we have "old" technologies and "new" technologies, we can compare their effectiveness for similar cohorts.

So far, although the use of new learning technologies has been documented in a variety of publications, there is not a great deal of comparative information between newer technologies and older technologies for similar cohorts.

The effectiveness of open and distance education, one of the main applications of the use of educational technology for adult learners, has proven the value of technologies in providing access to quality learning in many different contexts. But as yet, there is very little evidence that the newer technologies are any more effective, accessible or cost effective than methods that have been used for many decades, such as well-designed packages that may include print, audio and videotape, local tutorial sessions, telephone tutoring, and access to study skills and counseling support on an as-needed basis.

Many of the "old" technologies enable learners to study according to their own schedule, when they had time available, saving learner's time and enabling many learners to continue their paid work. By contrast, some of the newer more expensive technologies,

such videoconferencing, require learners to be at a particular site at a particular time, actually reducing flexibility for the learners and often requiring more time commitment.

Checking out the gift horse

In many cases, pilot projects to use new learning technologies start up with special funding, then are discontinued when funding runs out, Tony Bates observes:

> Funds will flow from government and the private sector for educational trials, partly to encourage technological development and hence commercial competitiveness and partly to stimulate services to a point where the take-up of the service makes it economical, or at least justifies earlier infrastructure investments.
>
> It is therefore even more essential that educators ask themselves- and potential sponsors- questions regarding access, costs, teaching purposes, user-friendliness and organizational implications before embarking on projects which may have technological glitz but may not either be valid educationally or economic as a sustainable system. [40]

What else could be done with the money?

Another issue to be considered is what might be called "displacement cost" - what programs, courses or services are being reduced or cut at the same time that there is increased expenditure for technologies? While it may be difficult to prove that there is a direct relationship between funding cuts in some areas and expenditures on technology, the fact remains that these allocations do indicate priorities and choices, and can be examined on the basis of the values that underly these decisions.

For example, William Birdsall comments on a report about a single mother using a computer and the Internet to access a course because she was unable to afford child care, and notes that the example begged a number of questions, particularly why there was money for computers, but not money for childcare. [41] There are no doubt many examples of investment in the use of technology rather than in human services, but this seemed a particularly telling one.

Some cost questions about new learning technologies

When dealing with costs, it is usually a good idea to begin with basic questions, such as, "what does this cost", and, "who is paying for it?" Further questions can explore costs in terms of values:

- What is the purpose of this investment? Is it to provide better access? More successful learning outcomes (and how do we define success)? or to achieve some other goal?
- What is the value returned for the expenditure?
- How can it be demonstrated that educational technologies are achieving the intended goals, for example that they provide better access as compared to the alternatives?
- How can we be assured that the costs of the new learning technologies are "worth it", and can there be an agreed set of values to measure this worth?
- In the case of specific segments of the population who have been previously underserved, can it be demonstrated that the costs of investing in new technologies are justified in terms of outcomes?
- How can it be shown that investment in new technologies represents the "best use" of funds, in comparison, for example, to subsidizing child care so that women can more readily participate in education and training?

Endnotes for Section Three

22. C. N. Parkinson, Parkinson's Law and Other Studies in Administration, Ballantine Books, 1957, p. 48

23. H.Menzies, Whose Brave New World: The Information Highway and the New Economy, Between the Lines, 1996, p. 8

24. R. Bernier, "Distance Education: Beyond Correspondence Courses", Canadian Social Trends, Spring, 1996, p. 22

25. This issue was debated at the 1992 conference of the Canadian Association of University Continuing Education and prompted intense responses on both sides. A summary of this debate is in Canadian Journal of University Continuing Education, Vol. XVIII, No.2, Fall, 1992, in a theme issue entitled, University Continuing Educators: Social Activists or Entrepreneurs?

26. For example, Eric Newell, president of Syncrude, "Business and Education working together to create the system we need"; presentation to the Conference Board of Canada's 5th National Conference on Business and Educational Collaboration, 1994

27. Menzies, op cit, p. 8.

28. British Columbia's Electronic Highway, Ministry of Government Services, 1995, p. 1

29. Distance Education and Open Learning: A Report, Council of Ministers of Education Occasional Paper # 1,1995. p.8

30. ibid, p. 2, quoted from a Stentor press release, April 5,1994.

31. CANARIE information kit, Jan. 1994.

32. In contrast, most computer-mediated discussions have a time lapse between when messages are sent and when they are received: this is called "asynchronous" transmission.

33. CMEC, op cit, cites Maritime Tel and Tel's estimates. p. 38.

34. Those interested in more details about the cost of various technologies for learning should refer to A. W. Bates, Technology, Open Learning and Distance Education, Routledge, 1995).

35. The Information Highway and Canadian Education: Discussion of Issues and Policy Recommendations, prepared on behalf of the Canadian Educational Network Coalition, the SchoolNet Advisory Board, and the Stentor Alliance, March. 1995.

36. CRTC Decision 96-9. Sept. 27, 1996.

37. A W. Bates, Technology, Open Learning and Distance Education, Routledge, 1995, p. 39.

38. Those interested in more details about the cost of various technologies for learning should refer to Bates, op.cit.

39. "Responding to the Information Highway", presented to the Working Group on Learning and Training, Information Highway Advisory Council, by the Association of Canadian Community Colleges, Jan. 1995, p. 6

40. Bates, op.cit, p. 179

41. William F. Birdsall, The Internet and the Ideology of Information Technology, paper presented at INET, 1996

Section Four

Quality and Equality of Learning

Overview

This section explores how technology affects the nature of the teaching and learning process in terms of two closely linked concepts, quality and equality of learning.

Quality is considered in reference to perspectives that support more holistic approaches to

learning, including those developed by feminist educators, and by practitioners in adult and in distance education.

Considering the issue of equality of learning entails looking at whether particular strategies or technologies tend to favor some types of learners more than others, and whether disparities result from intrinsic characteristics of a technology, or simply from choices about specific approaches and applications. These are some of the questions addressed in this section:

- To what extent are new learning technologies appropriate for different approaches to learning and different types of learning?
- To what extent are new learning technologies appropriate for different kinds of learners?
- Are there approaches to learning that are precluded by using new learning technologies?
- Are there approaches to learning that are supported much better by new learning technologies than by previously used strategies?
- To what extent do new learning technologies accommodate "women-friendly" approaches to learning?

Background: Perspectives on learning

Within the broad range of theories about learning, two opposing perspectives are most relevant to this discussion. Franklin describes this divergence as the difference between production models and growth models. Production models are based on discrete, controllable processes and outcomes, whereas growth models describe more spontaneous processes emerging from the dynamics of human interaction. She notes,

"If ever there was a growth process, if ever there was a holistic process, a process than cannot be divided into rigid predetermined steps, it is education."[42]

There are many cases in which the use of educational technologies is based on a production model of learning.[43] However, the perspectives used to consider quality and equality of learning in this paper are based on growth models of learning.

These include feminist perspectives and viewpoints emerging from adult and distance education. These perspectives that support holistic approaches to learning are particularly relevant when we want to consider the extent to which new learning technologies support a full range of approaches to teaching and learning, and accommodate different types of learning and learners and differences based on context and community.

Feminist perspectives

There is a long tradition of philosophical and psychological speculation about differences between men and women's ways of perceiving and understanding the world: recent concepts are concerned more with gender- the socially framed context which shapes the different life experience of women and men- than with sex specific differences that relate to differences in physiology. The

issue of what has been termed "women's ways of knowing" has been at the core of an educational discussion for the past 15 years, since the 1982 publication of Carol Gilligan's work, *In A Different Voice: Psychological Theory and Women's Development.* In Gilligan's terms, gender-related ways of approaching the world result from:

> ... the wish (of men) to be alone at the top and the consequent fear that others will get too close: the wish (of women) to be at the centre of connection and the consequent fear of being too far out on the edge. These disparate fears of being stranded and being caught give rise to different portrayals of achievement and affiliation, leading to different modes of action and different ways of assessing the consequences of choice. [44]

Different ways of viewing the world affect how people learn. It has been suggested that the more socially-oriented framework of women's lives fosters a more cooperative approach to learning, which values discussion, shared experience, and the opportunity to relate new learning to one's own life and experience.

Adult and distance education perspectives

It is not only feminist approaches that value more socially-oriented learning principles. Those who work in and write about the field of adult and distance education point out the importance of egalitarian approaches to learning that respect the learners' experience and allow for integration of learning and life experience, through discussion, cooperative learning strategies and an equal emphasis on the learning process as on learning outcomes. For example, MacKeracher refers to the intrinsic drives to human action as competence, the skills, knowledge and attitudes to operate independently, and connectedness, the sense of belonging in rewarding relationships. [45] Aboriginal educators assert the value of approaches that provide for continuity between learning and life, and that support social learning strategies based on community values.

Different learning tasks, different strategies

The perspectives listed above relate to beliefs about learning processes that generally influence how we approach teaching and learning. At a more specific level, there is a relationship between learning goals- what you want to achieve- and learning strategies- how you go about achieving it. How we make these choices depends on experience and knowledge about what works best, as well as on our perspective on learning.

For example, a learning goal that involves memorization, such as remembering the names of all the bones in the human body, might be supported by group or individual exercises and reinforced by applying the newly learned information in a recognizable context. Those who see memorization as the individual's mastery of information might emphasize individual, repetitive exercises; those who see the process as more relational might enable to learners to work together to build their knowledge. Those who believe learners should be able to use their preferred learning style might set up a context that supports a range of individual and group learning processes

As another example, a different type of learning goal would be developing learners' awareness of a social concern, such as the role of the media in shaping perceptions of gender issues. Strategies might include individual or group exploration of the topic, some guidance about key issues and resources from an instructor or facilitator, and opportunities for individual reflection and group discussion to enable learners to process what they are learning and relate it to their own lives. Some learners might prefer to investigate the issue on their own, by referring to the library and other resources, others might want to work collectively, beginning with specific examples of media stories and then developing ways of analyzing them.

Rather than attempting to match the scope of learning goals and strategies against the range of new learning technologies available, we present some examples that illustrate general principles for exploring the possibilities and drawbacks of new learning technology.

As we know, learning is never just one discrete activity or process; like any other aspect of human activity it is multifaceted and complex. Keeping this in mind, for the sake of discussion, we can identify some common elements of learning, such as:

- finding information:
- integrating knowledge;
- developing skills;

and examine how these can be supported by the use of learning technologies, old or new, and how these strategies compare with other approaches, such as face to face interaction.

Finding information

Acquiring information is not the same as learning. Adult learners need to be able to develop a purpose and framework for information they are seeking, to reflect on it and then to integrate it with their prior knowledge.

The information acquisition aspect of learning has been emphasized with the advent of the World Wide Web that has vast numbers of websites and huge amounts of information. To some extent this emphasis has overshadowed the need to develop a framework with which to understand information.

In formal education, lectures, presentations or readings provide information as well as concepts to help understand its significance. Classroom or seminar discussions enable learners to integrate new knowledge. Libraries provide systematically organized information resources, and in some situations, learners can gather information from knowledgeable people in the community. In nonformal education, learners often work cooperatively to gather and share information and apply it to a particular context.

How do technologies help?

Examining how more familiar technologies are used for particular aspects of learning provides a point of reference in looking at the newer technologies. For example, one of the oldest educational technologies, print, is a very good medium for presenting information, because it is stable, rather than ephemeral, provides a structure that allows for reference and review, and allows users to process it at their own pace. Users can modify print materials and integrate new knowledge, by developing their own notes that relate the information they read to other information and/or their own experience.

Using these attributes of print as a benchmark, we can examine other learning technologies to see how they compare with print in terms of presenting information. Audio or videotape allow users to review segments, but not as readily as print does. The more ephemeral technologies, such as radio, video, audio conferencing and videoconferencing, do not allow for reference and review, or permit learners to process input at their own pace. Depending on the structure of an audio or videoconference, there may be opportunities for learners to participate and integrate new learning.

Computer conferencing allows users to capture and download information, print it out, and then consider it, and in many cases, users can develop and annotate their own responses to the material. Users can use this medium to share with others their written responses to the material, and thus contribute to the further development of information as active participants rather than passive recipients.

This capability of computer conferencing to allow for shared learner contributions is an advantage over print, especially in distance education situations: achieving the same goals through print would require developing and sharing print materials, which is easy enough to do in a classroom setting, but requires the use of mail or fax distribution systems to accomplish at a distance, and can lose the immediacy of response.

On the other hand, transmitting large quantities of information via computer mail requires learners to take considerable time to download and print it, and it would be much simpler to provide the material in print in the first place. In non formal learning, there are some interesting examples of women with common interests in different countries using computer mail and conferencing to support information gathering and communication. These examples are presented in the section on Opportunities for Learning.

Obtaining information from the World Wide Web may provide learners with an opportunity to explore a much broader range of information than would be possible to provide in printed textbooks, but on the other hand it may not necessarily provide the depth of information that can be presented in a large and coherent printed work. Unless they have developed a framework for selecting information and judging its relevance and accuracy, learners could feel bombarded with information when exploring the Web and be

too distracted to focus on the important elements they want to know.

Integrating knowledge

Presentation of information is just one component of learning. But, as we know, a significant part of learning involves integration, the development of judgment, social and relational skills, and application of new learning to one's life and work.

Learners integrate new knowledge with what they already know and further develop their awareness of the world, whether they are mastering a new concept in mathematics or analyzing political theory. Although there are solitary learners whose preferred mode is to reflect alone, for many people, discussion and interaction is an important element in integration of learning. One educator, Sally Haag, has described this as "how do I know what I'm thinking until I hear what it is I have to say?" Another educator commented, "Sometimes we don't know we know as much as we do. Sometimes we don't think that what we know is valuable. When you put it down on paper, and share it, it becomes valuable. It's a form of legitimization... Knowledge can be legitimized by sharing it with someone else."

From the field of open and distance education, where learning technologies have been used for several decades, there is a significant amount of evidence that women in particular value the interactive, social aspects of learning. This research is particularly relevant when considering the newer learning technologies, whether they are used for on site learning or for situations in which learners and instructors are in different locations.

Women as interactive learners

The independent and combined research efforts of von Prummer and Kirkup in two distance education institutions in Germany and Britain demonstrated the extent to which women learners value social learning and connectedness. They found that even in an educational context geared more towards individual, self-paced learning with occasional group study sessions (Fërnuniversität and the UK Open University) women learners made more use of study centers than men did, even though they had to deal with more obstacles, such as child care and transportation arrangements than did men[46]. As well, women were more likely than men to involve family and friends in their learning.[47] The researchers also found that although equal proportions of women and men felt isolated, far more women than men (40% compared to 24%) were bothered by this isolation. They attribute this response to a greater desire among the women for connection with others.

While it could be argued that these women sought out opportunities for face to face interaction, there are indications that interaction mediated by various technologies is used and valued if it can provide a safe and non-threatening environment for discussion and reflection.[48]

But interaction does not necessarily require new learning technologies. More than a decade ago, a creative distance educator set up arrangements for participants in a women's studies course to communicate by phone and mail. Her extra efforts, more than the choice of any particular technology, provided support and encouragement for learners to interact.

Computer mail and computer conferencing seem to be media that can provide for the kind of interaction that can lead to integration of knowledge and the bridging of theory and practice. To work successfully, conferencing requires an instructor or facilitator to provide a discussion framework and continue to be involved in and comment on the discussion threads as they emerge. [49]

Potential drawbacks of technologies

There are also examples in which the need for reflective interaction and discussion may be hampered by technology. In one case, a women's studies course offered by videoconferencing raised questions about how to establish a trusting environment that allowed learners to integrate the personal and the political. The challenge was not just that one group of learners were at a distance, but that observers who were not part of the group could "drop in" unnoticed at the other site, perhaps just to observe how the technology was working, but potentially disrupting the feeling of a safe environment that was needed for this type of discussion. As well, there were concerns about how well the context could be shared among all sites, and that comments could be misinterpreted without a clearer sense of the context in which they were spoken. These concerns about safety, trust, and confidentiality also arise in computer conferences and are particularly pertinent to subject areas in which women tend to be the majority of learners, including counselling, education and health care, where both learner trust and client confidentiality are important issues.

It can be argued that these concerns are not necessarily an intrinsic feature of the technologies, but could be addressed by a concerted effort to develop and follow protocols, possibly using some human or technical "gatekeepers". Another issue that prompts critical reflection is why some technologies seem to create contexts in which people suspend inhibitions--- perhaps an advantage for someone reluctant to speak in a group, but a definite disadvantage when it leads to harassment and stalkers on the Internet.

Skill development

One of the areas in which technologies were first used for learning was skills development, whether as a means of reinforcing reading skills through specially designed print programs or learning the correct method for CPR on a Resusci-Annie. One commentator pointed out the extent to which learning technologies have been used to train people in using other technologies, and remarked that there seemed to be a fairly natural continuity in this approach, providing the system was well designed and complemented by a lot of other opportunities for practice and for mentoring.

How do technologies help?

It has been suggested that women's use of technologies tends to take a very practical orientation, and this is perhaps most true in the field of skills development. While there are many situations in which technologies help to "teach" skills, for example a video that demonstrates a technique, or a computer program that corrects spelling, it is the exceptional learner who learns wholly from technology. One observer suggested that technologies that provide for practice and feedback can be very useful for building learners' confidence and skills. Learners can then go on to apply these skills in a new context, supported by mentoring and interaction with peers and/or an instructor.

The instructor's perspective

So far, we have considered the possible uses of technologies for a number of aspects of learning, primarily from the perspective of the learner. However, given the important role of the instructor or facilitator with or without learning technologies, we should also consider the impact of learning technologies for the instructors who use them.

The dynamics of introducing learning technologies

There is considerable literature on the dynamics of adoption of a new technology in organizations, from the time when the "early adopters" take it on, through to the period when the majority of people decide to use it, to the point when only a few are not using the technology. [50]

This description tends to imply that the acceptance has largely to do with individual attitudes, but the institutional setting has a significant role regarding the effective use of technologies. If people are allowed to explore technologies and determine for themselves whether or not they are appropriate for their particular context, there is more likelihood they will learn more about them and find creative ways of using them.

However, when the use of a specific technology is mandated by special funding arrangements, the institution must them find instructor willing to undertake pilot projects. There is some anecdotal evidence that more women instructors seem to be asked to teach using new technologies in trial runs.

Conditions that support technology use

The introduction of any new technology, considering technology as "a way of doing things", requires a supportive environment, in which everyone involved can learn not just how to use a piece of equipment, but how to use it for its best purpose; how to use it creatively and how to explore its potential. This type of general learning takes place over

time, and is based on experience as well as training on cooperative exchanges between users, on mentoring as well as demonstrations. [51]

For a specific situation, instructors need to be able to learn enough about a particular technology and its application to decide whether and how it is useful. They need preparation time so they do not enter into a situation with a "sink or swim" feeling. They may need ongoing technical support to help them and/or their students to make the best use of the technology, and they should also have access to information, facilities and time that will help them develop an appropriate evaluation of the experience.

Women instructors' concerns

Women interviewed for a recent study on instructors' learning needs indicated that they learned from colleagues, form experience, from their learners, from reflection. They also placed special priority in maintaining connectedness among learners and in minimizing any potential disruption the technology might cause. Women instructors sometimes report that they feel at a disadvantage in technology training sessions because their orientation towards using the technology is less instrumental than that of their male counterparts, and they want more time to explore and consider how the technology can be best used.

These considerations are as much a requirement for quality learning as are all the other issues more directly related to learners: an instructor who feels constrained to use technology and does not feel competent is less likely to be able to provide a quality learning experience as one who has decided to use technology and feels comfortable using it.

Keeping a holistic approach in the forefront

Within a holistic perspective, supporting the multiple dimensions of learning is an essential attribute of quality in learning. One of the potential drawbacks in focusing on any particular strategy in education is that the emphasis can be at the expense of other elements that are equally essential for a quality educational experience. Reflecting on their long experience in using learning technologies for open and distance learning, educators warn about the dangers of depersonalization and an overemphasis on delivery of content as opposed to facilitation of learning.

Learner support

Learner support is one aspect of learning that tends to be eclipsed by emphasis on technologies and content. In the emphasis on finding ways to "deliver content" here has been a tendency to lose sight of the needs of the learner as an individual. Based on many years' experience in counseling in distance education. Brindley urges educational providers to assess priorities continually "within a set of principles that clearly articulate beliefs about the learners and how the learning process can be facilitated." She notes it is especially important to maintain a learner-centered approach and substantial learner

support in the face of the enthusiasm of governments and the private sector to regard open distance learning systems as 'high tech', inexpensive and quick methods to provide education and training." She adds, "in tough economic times, it is all too easy to pay less attention to the more complex aspects of the intellectual, emotional, and self-management processes in learning."

The importance of evaluation

Another element in working towards quality learning experiences is taking the time to consider how well any particular strategy or technology has worked in a particular context, Pacey and Penney note the importance of careful reflection on practice:

Distance education and open learning have always promised and delivered easier access to quality education for learners. This result has been achieved through painful analysis, self- criticism and comparison with benchmarks established by conventional educational institutions.

Effective educators have to rethink the process of learning and education, so that the product of education becomes a curriculum that is designed and modified to meet the needs of the learner. [52]

Rather than supporting a production model of education, Pacey and Penney suggest that for "progressive educators, their agenda must be to enable the learners and learning rather than to cover content and process students."

Evaluation is usually a requirement for any educational innovation. So far, there seems to be insufficient coordination among users and proposed users of new learning technologies to start developing a picture of their effectiveness, both in terms of how well they serve learners and how they compare to older technologies and to face to face instruction. As the submission of the Association of Canadian Community Colleges (ACCC) to the Working Group on Learning and Training of the Information Highway Advisory Council notes, "Unfortunately, we know little about the effectiveness of learning software and multimedia products from both a pedagogical and cost-benefit perspective."

The ACCC submission promotes an approach of realism and respect for what has been proven to be effective.

> It is important that we accept that fact that we are moving and working towards our goals and the process is piecemeal. Consequently, we must build our facilities and acquire our resources in a way that does not preclude any possibilities. Flexibility and 'upgradeability' are key components in the development of an education information technology strategy. We must also build on the lessons learned from previous approaches to distance education, particularly those pertaining to pedagogical issues and sociological impact issues. [53]

Those directly involved in using learning technologies, as learners, instructors, facilitators

and planners should have an opportunity for input into how these technologies should be evaluated, and insist that issues of gender and marginality are included in evaluation strategies.

The impact of the economic rationale on quality

The economic agenda can also frame and affect issues around quality of learning. One of the primary economic rationales for the use of various technologies is one that might be called "Replace the teacher". This rationale for using learning technologies emerged in the 1950's with the development of highly structured text based materials that used behaviorist approaches to develop specific competencies, for example, reading and mathematics skills.

Competency based approaches are used as the basis for developing increasingly sophisticated learning materials (now often computer-based or multi-media) that learners can work with independently. It is generally agreed that these strategies do not stand alone, but must be complemented by opportunities for interaction to enable people to integrate learning in context through discussion and application.

The "replace the teacher" rationale for using technology

The "replace the teacher" rationale for technology has not disappeared. In fact it has turned up in the final report of the Information Highway Advisory Council, in its reference to the cost of what it terms "The Learning and Training Industry":

> Annual expenditures in formal education (excluding training expenditures or employer-based training) add up to approximately $50 billion. Formal public and private education (excluding employer based training) has a total payroll approximately equal to that of either the health and welfare sector or the transportation and communication sectors. Its payroll is larger than that of all levels of government combined. [54]

Rather than regarding this high proportion of educators as a measure of a country's commitment to social development, as for example, UNESCO does, the IHAC report seems to regard this as a drawback, one that calls for the use of "more efficient" technology based tools:

> Indeed, for producers of learning materials, teachers, trainers, and support staff, time is the highest cost of the learning and training process. Using the technology can make the learning process faster and more efficient, therefore cutting costs. [55]

Outcomes for learners

The cost-cutting rationale will have an impact on quality and equality of learning as long as the "replace the teacher" belief continues to shape how and why technologies are used, despite ample evidence that using learning technologies requires at least as much and usually more time on the part of instructional staff. A heightened awareness of the cost cutting rationale might make it easier to detect, even when it is wrapped in the warm fuzzy clothing of "improved learning".

As experience with previous experiments with learning technologies has demonstrated, relying on technology to "replace the teacher" provides a very limited type of instruction, suitable only for the most independent and self-reliant learners. It does not serve the majority for whom human interaction is a very significant part of learning. Moreover, it is even less appropriate for those who face challenges in re-entering the world of learning, because of learning disabilities or lack of prior education, and for those whose learning context is shaped by cultural differences, gender, or other factors. These people are most in need of accessible and appropriate learning opportunities.

Another outcome of the cost-based rationale for using new learning technologies is that because of the high cost of development of materials, there is increasing pressure to use these materials for more and more learners, whether or not they fit the profile of the learners for whom the materials were originally developed.

In its section on Learning and Training, the IHAC report asserts that "Canada lacks a critical mass of users to sustain a viable domestic learning and training industry." (p. 63), (which seems to runs counter to the reality that Canada has been educating its own citizens, in its own institutions, fairly successfully for the past 100 or so years) and encourages provincial and territorial governments "to develop, with the private sector, full credit courses and to make them available to all Canadians."

This mass-market approach runs counter to the often promoted advantage of the new technologies, that they can be readily developed and customized for particular learners. More importantly, it contradicts one of the basic principles of adult education, that the learner's context and experience must be included in the design of adult learning. This is a particularly critical issue for women learners, who have tended to have to adapt to materials and technologies developed for others, rather than have materials and technologies adapted specifically for them.

Some questions about quality and equality

The issue of quality and equality of learning can, in some contexts, lend itself to more theoretical than practical discussions. But the real measures of quality and equality of

learning are in the hands of learners and of instructors, facilitators and coordinators. Their direct experience in the situation gives them a unique perspective from which to ask and answer questions about how learning technologies affect them. These are some questions to ask about quality and equality of learning that can be offered by new learning technologies:

- To what extent is it appropriate for the learning task at hand?
- To what extent does this technology broaden, rather than narrow, the kinds of teaching and learning approaches that can be used?
- To what extent does it support individual learning, by permitting self-pacing, ready access, learner control?
- To what extent does it support social learning: by enabling consultation among members of a group: facilitating peer learning, supporting mentoring?
- To what extent is this technology transferable, so that once one has learned how to use it, it is useful not just in the specific learning context, but is applicable in other learning contexts, and at work, and at home?
- What advantages does it offer over other methods, for example, classroom learning or other technologies?

Endnotes for Section Four

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42. Franklin, U., The Real World of Technology, p. 29

43. For example, O. Peters in 1973 coined the term "industrial model" for distance education systems. Subsequent theorists have disputed this perspective.

44. Gilligan, C., In a Different Voice: Psychological Theory and Women's Development, Cambridge USA, p. 62

45. MacKeracher, D. Making Sense of Adult Learning, Culture Concepts, Toronto, 1996.

46. Christine von Prummer, Women-Friendly Perspectives in Distance Education, Keynote Address at International Conference, Umea, Sweden, June, 1993

47. Gill Kirkup, The Importance of Gender as a Category in Open and Distance Learning, Keynote address at cPutting the Student First: Learner Centred Approaches In Open and Distance Learning,

Cambridge, UK, July, 1995

48. For example, Burge, Lenskyi, Rossner, and Cragg have documented women's response to conferencing technologies.

49. Interview with Dr. Vivian Rossner, Simon Fraser University

50. Adrian Kershaw, People, Planning and Process: The Acceptance of Technological Innovation in Post- Secondary Institutions, Eduational Technology, Sept.-Oct, 1996

51. Elizabeth Burge and Jennifer O'Rourke, The dynamics of distance teaching: voices from the field, chapter in Faculty Development in Distance Education, in press, 1997

52. Lucille Pacey and Wayne Penney, Thinking Strategically: Reshaping the Face of Distance Education, in J. Roberts and E. Keough, eds, Why the Information Highway: Lessons from Open and Distance Learning, Trifolium, 1995. p. 37

53. Association of Canadian Community Colleges, Responding to the Information Highway, Presented to the Working Group on Learning and Training, Information Highway Advisory Council, Jan. 1995, p. 4

54. Final Report, Information Highway Advisory Council, 1996, p.60

55. Ibid, p. 61

Section Five

Opportunities for Learning

Overview

This section presents examples that show how new learning technologies can offer a range of opportunities for women's learning. These examples focus on ways in which women in the educational sector, both formal and technical, and in the non formal sphere, have accepted the challenges of new technologies and developed ways of using them to meet their needs.

We have tried to select examples that build on principles from adult learning and feminist pedagogy. Many of the examples show that holistic approaches to learning can be compatible With new technologies: they include women teaching women or supporting women's learning, adult basic education and aboriginal education. The emphasis on technical and social support for the individual learner, the importance of interactivity and feedback, and the significance of relating new learning to one's own life and experience are principles that inform these approaches.

Carol Gilligan has spoken of women's fear of "being too far out on the edge", but for some of our respondents, this is where they want to be. Like the female pioneers in the trades and technologies, the women who wander with comfort and ease in cyberspace not only exist in growing numbers but offer their hands to those less confident and even fearful. As Dale Spender, a leading authority on women's issues in Australia, said in a recent address to Winvet, Australia's Women's network for technical and vocational education and training:

> There are only three things to be said about the computer and the Internet to put women's minds at rest: it doesn't hurt it won't bite you, you won't break it and it won't make a mess. [56]

In Spender's view, there should be less emphasis on the technology and more emphasis on women's culture.

No one will argue that the new technologies have been primarily colonized by men; yet women are making their mark in software development, in technical writing, and as communications specialists, designers and innovators. The new technologies are grounded in communications; and without content, really do go nowhere. To some, the computer in combination with the Internet embodies a potential and potent force towards "democratization" of learning and knowledge. As one of our respondents put it, "The new technologies can give a woman, if she doesn't have a fear of using it, access to an incredible amount of resources and associated support for anything she wants to do."

The information presented here is also meant to provide examples of "good practice" or to illustrate the potential range of uses for technology. We provide a picture based on information collected at a particular point in time. We invite you to add to the examples.

Some criteria for good examples

The examples listed here demonstrate just a few cases in which new learning technologies have been used in situations that support holistic and women-friendly approaches to learning. Examples that demonstrate how new learning technologies enhance opportunities for women's learning have some or all of the following characteristics:

- The technology improves the learning experience, compared to what was previously available.
- The technology allows for learning processes or outcomes that could not be accomplished in other ways, in terns of accommodating learners previously unable to participate, and/or in terms of providing access to learning experiences

previously unavailable.

- The improvement of the learning experience is related to the learning itself, such as an enriched experience, greater depth of learning, broader scope of learning, increased opportunities for cooperative and collaborative learning,

- The improvement of the learning experience relates to factors relevant to women's learning (for example, appropriateness of content or process, interaction, connectivity, inclusion of life experience)

- The improvement of the learning opportunity relates to practical factors for learners, such as increased access, lower cost, more compatibility with learners' other commitments, for example, to work or family.

Some examples

Non formal learning and information sharing

The ways in which women have organized themselves to use new learning technologies, particularly the Internet and the World Wide Web, for nonformal learning, supports the observation that women tend to use technologies for a specific purpose immediately relevant to their lives. For example, women are using the Web to exchange information on particular topics, such as personal and community health issues, justice issues, including abuse and violence against women. They are also using the Internet to establish lines of communication that transcend regional and national boundaries, establishing a commonality with women with shared interests in all parts of the world.

One example is the development of an e-mail network for women in the former Yugoslavia, which helps women throughout the region, of different ethnic and social backgrounds, communicate their experience and work towards social change. Again, their focus is on the end-result of what they can do, rather than on the technology itself, as the author notes, "Exercises used during the training do not exalt the technological wonders of e-mail or the computer, but are focused in daily, practical applications that are relevant in women's lives." [57]

International networking

In 1996 the Association for Progressive Communications (APC) Women's Networking Support Program, a global program to support computer communications for women, conducted a survey asking women to reflect on the program and give feedback on developments in the three years since the inception of the program. Respondents reported that "despite the obstacles, women have made great strides in adopting electronic communications, and have benefited from the support and facilitation provided by

proactive initiatives like the APC Women's Networking Support Program." [58] In response to the survey (100 responses from 28 countries), e-mail was identified as the most commonly used tool, with electronic conferencing, mailing lists and Web sites increasingly being used as well. Respondents reported that they are able to act as a "bridge" to unconnected groups to share information. For example, a group in Russia uses information received by e-mail and reproduces the material in other formats, such as print and fax, for dissemination to other women on radio and television.

Network activism

In posing the question "What Do Women Activists Do Online", Scarlet Pollock in Women'space points to debating issues, developing priorities, mentoring, care giving, networking, promoting awareness and taking action.[59] Members of Women' space and other organizations such as Web Networks, have also assumed a role in the monitoring of government supported programs which are aimed at broadening community access to new technologies. For example, members have attended conferences sponsored by the Community Access Program to lobby for, among other things, program eligibility criteria aimed at increasing access of women and other disadvantaged groups.

The experience of non formal learning, both nationally and internationally, is a good example of what technology can do that could not be done before. A contextual approach entails understanding the social conditions peculiar to a particular time and space: understanding the context in which the relationship of women and technology develops allows us to incorporate the reality of women's social existence, their influence and opinions, into technological development.[60]

The non formal learning community has also raised issues related to language as a barrier to access. Virtual Sisterhood (vs-online-strat) discussions are conducted in English but "virtual volunteers" are taking steps to make information available online in Chinese, French, German, Japanese, Russian, and Spanish.[61]

Technical learning

Women are also developing approaches to learning about the technologies themselves, using a variety of strategies that go beyond the "read this, do that" orientation of manuals and instructional materials. They are encouraging mentoring and providing supportive groups for those new to technology, offering varying levels of informal information sharing tailored to the learner's level of comfort, competence and interest.

Organizations such as Web Network and publications such as Women' space here in Canada provide support to community development groups and other advocacy groups so that their online experience will work and work to their advantage. Providing good technical instruction involves the instructor working with the groups to determine baseline

needs and translating those needs into instructional guidance using plain language. The goal is to help individuals and groups articulate their communications needs.

Web Network then works with the group to devise innovative, appropriate technical solutions, trains the groups in the use of the technology and provides support materials and follow up support to meet the needs. This kind of training is an essential component of access. As stated by one interviewee: "having an account isn't access" or as another put it, "a perfectly good system was in place and it wasn't being used". Technical support, like that provided by Web Network's manual, "Web for Women", helps women's groups achieve practical use of communications technologies.

Formal learning

The need to provide support to meet the needs of the learner is echoed in the formal learning sphere. For example, in Australia a National Plan of Action for Women in Technical and Further Education (TAFE), was established in 1992 to address the issues surrounding new technologies focusing on the delivery of training to women. "The power of open learning lies not in the tools-- the technology itself--but in the flexibility and thus the power it places in the hands of learners." A national research project funded by TAFE and the National Plan, found that 'Women students were not daunted by the need to use communication technologies and computers in flexible delivery, [rather the]...concerns...related to limited access and technical services available to support students' use".[62]

Adult Basic Education and English as a Second Language Programs

In Canada, there are a number of examples of "best practices". For example, people with limited literacy skills in an ABE program are enabled to use computer technology for a variety of learning projects. Their instructor observes that because they are accustomed to using memory and visual cues, people with limited literacy can quickly learn how to use computers for drawing, painting and writing. They can overcome obstacles such as poor handwriting and spelling by using the computer, and produce visually attractive print materials that they can feel good about. Those involved in the program note that mastery of computer skills gives learners a sense of self-esteem and of control over their environment and increased confidence in their ability to continue learning. As students gain mastery, they are also encouraged to go beyond keyboarding skills and to learn about the hardware. Computers can also be put to good advantage for ESL students, enabling them to practice writing skills and learn vocabulary.

Learners can develop confidence, not just by using computers, but by learning how they work. One commentator ensures that learners she works with have opportunities to move, fix, and take apart computers. One of these learners, a young immigrant woman, went on from an ESL program to complete a library science degree at university and then found a job at the local library. One day when the computer broke down, she impressed her

colleagues when she opened it up and fixed it, using skills she had learned originally in the ESL program, Both the ABE program and the ESL programs described above adopted some guiding principles which would appear to benefit not only their students, but all students. These were that the program must be appropriate and allow for interaction; that the technology should enhance what the teacher is doing: and that the student and her needs must be the program focus. In other words, the technology is just a tool; it cannot replace the teacher.

Cooperative research and collaborative learning

There are also examples in the formal learning sector of gradually developing a robust technology and customizing the application to enhance and build learning. At Malaspina University College in British Columbia, there are two examples of interactive databases that support cooperative research, both among learners and researchers engaged at the same time in a project, and between one cohort and subsequent groups of learners and researchers.

In one example, a multimedia application developed for researchers working in the field of killer whale vocalization became a huge sound database that each student can use, adding their own input for others to use. Essentially, once sounds were recorded, the user could isolate one segment of sound, make notes about the whale behavior for that segment and save that particular sound and the descriptive notes to a new screen. By adding the element of interactivity, users can dynamically add to and change the application for other users, as well as building up a dynamic body of research over time.

The other example from Malaspina involves the development of a stream survey database which has been built up over time. Each year, students walk up the streambed making video and audio notes as they observe the bed, link it to the GPS (Global Positioning Satellite) and input information into a database. One year, aquaculture students might concentrate on the salmon in the stream, the next year biology students might document the vegetation, a third year students might look at soil structures and so on. Again, the user is customizing the database and making it more and more useful for others, contributing to longitudinal studies.

Women's Studies

Using the new technologies to build histories and databases, whether they be of women's lives or whale vocalizations, can contribute to knowledge creation and learning. At Massey College in New Zealand, a new Women's Studies Program includes an extensive distance education component (all but one core undergraduate course are offered at a distance). Program developers have identified two skills sets as necessary for their undergraduates (both intramural and extramural): familiarity with communications technologies like e-mail, file transfer, gopher and the Internet; and educational "chat" programs. With access to one on one tutoring to help them learn computer skills, first year

students are assigned projects which will introduce them to online feminist resources, with the intent that by, the completion of their studies, students will be able to design and compile databases. "The impetus for this comes from a lack of oral histories of women's lives and the sense that networked knowledge bases that have social issues as their focus may be able to become learning and activist tools of use to both the university and community-based feminists." [63]

Management training

In the Northwest Territories the government is currently implementing a long term plan to double the representation of Inuit people in the public service. The challenge is how to provide the required education and training for learners who are dispersed over a vast area. The Human Resources Planning department has negotiated a tripartite agreement on Inuit training (Inuit group, the federal government, and the NWT). The project employs a variety of technologies to address the challenges of the project. Vast distances in the North present a significant barrier. Discouraged by the results of packaged computerized learning without support mechanisms, they have turned to a blend of techniques that combine information/communication technologies and personal support.

The program uses management training courses currently offered by the Canadian Centre for Management Development in Ottawa. Participants, all employed adults, spend two and a half weeks per year in a classroom, and the rest of the time keep in touch by e-mail to instructors and by using technology to form peer support groups. Mentoring in the workplace and participation in different development assignments are integral parts of the training plan. The initial perception is that the first year is going well. A student evaluation is yet to come.

What can be learned from these examples:

These examples demonstrate some principles and also lead into consideration of some broader questions.

- Don't make assumptions about capabilities of learners, in terms of what people can or can't do. (For example, some people might assume that people with limited literacy cannot use new learning technologies.)

- There are several examples of programs in non-formal settings more appropriately tailored for women. Is this because in these settings women are more likely to be making decisions that shape the programs?

- In both the formal and non formal learning sectors, some people indicated that certain technologies can increase the participation of women. To paraphrase one respondent, courses that use e-mail or newsgroups discussion groups allow people to spend more time "prethinking" what they're going to say. And they don't need to

interrupt anyone to say it.

- Introduction of new technologies raises questions about educational strategies and their effectiveness, often highlighting issues that have been on the back burner for some time. For example, using a lecture format is not usually effective in conferencing technologies. "So now we're starting to ask questions, like how effective was lecturing beforehand?"

Following up the good examples

Proponents of new technologies often put their "best cases" forward to demonstrate the value and viability of a particular application. It is instructive to follow up with these examples after the spotlight has faded, to determine how well they have met the initial promise after the start up phase. As well, there are some criteria that can be applied to cases to determine whether they are in fact good examples of the use of learning technologies. These are:

- Does the example continue to demonstrate an appropriate use of technology, in the sense that the technology meets the needs of learners, context, content?

- Does this example continue to represent a genuine improvement in providing access to learning and/or quality of learning?

- Is the example sustainable, in that it can continue to be affordable and manageable after the initial start-up phase?

- Is the technology sufficiently robust, both in terms of durability and of continuity (vs. continual updates, changes, obsolescence) to continue to be usable?

- Are there trade-offs in this example? - for example are there some "winners" in terms of increased access, but some losers, in terms of increased cost?

- To what extent does this example provide a model that can be applied to other contexts, especially contexts related to women's learning?

Good practice and funding realities

One would hope that examples that do demonstrate the effective use of new learning technologies, especially for those who have previously had limited access to learning, will eventually influence the criteria for funding projects. So far, this does not necessarily seem to be the case.

For example, Industry Canada sponsors programs such as the Technology and Applications Development (TAD) Program, which provides up to 50% of the cost to a maximum of $1 million to stimulate innovative research and development in networking projects and applications for the marketplace in health care, education and lifelong learning. But in the materials developed to promote the program, there is no mention of

women and other disadvantaged groups. In fact, these references are conspicuous by their absence. This is not to say that women need not apply, but only to imply that it is not an inviting environment. If equal opportunity is an issue in these programs, they certainly make no mention of it in their descriptive material.

A personal and practical approach to learning technologies

A number of our respondents said their attitude was to approach technologies systematically, and step by step. One of our respondents, who is very conversant with the new technologies spoke about her approach:

> I always put myself in the role of the user. What would I like to do? Very early on I got involved in multimedia, which then took me into the 'realm of the traditional audio visual area. And so I got involved in digital imaging, using a computer to control a VCR and camera... and of course, videoconferencing. So I saw a merging, a convergence of those two areas. I tended to learn other technologies because they were related. For example, an instructor wants to make a multimedia CD Rom about parasites. So then I had to look into what's a good video camera that we could hook into a microscope and then we could just tape it. How do we put titles on the video? Then once we've got that we do the digital and the CD part of it, You have to go through the other technologies as well. Then I became aware how those other technologies... can be used in a classroom and what it does to the students, how it impacts them, and their reactions to it.

The global picture

In "Adult Learning in a New Technological Era", a recent report of the Organization for Economic Co-operation and Development[64], the authors present their position on the opportunities, outcomes and challenges. Some of the issues they highlight are:

- The potential of technology to enrich individual and community life, e.g., people can write and perform music, develop and share family trees, re-design their own kitchen, publish their own writings.
- The potential of technology to increase accessibility of intellectual resources, particularly for learners working and studying off-campus which, in turn, points to the need for local networks and connections for this potential to become reality.
- The potential for instructors to keep abreast of new developments in their field of study .
- The potential to use teaching techniques not feasible otherwise, e.g., using video cameras and digitized images to improve physical performances (in dance, sports),

or using simulations to perfect skills.

- Using the issues around introduction of new technologies as a stimulus for re-examining existing teaching practice and course material to look for the optimum way of improving learning, so that technology is not introduced simply because it is there.

Questions about learning opportunities offered by new technologies:

Learners, teachers, facilitators and planners should all be in a position to examine how new learning technologies are being used, and what opportunities are being provided. The following questions address issues that commonly arise with new programs and new technologies:

- What new opportunity does it provide? To whom does it provide it?
- How is the learning opportunity enhanced by the new technology- in what ways is it better?
- How does it provide it- what systems does it use, what support, staffing, and so on?
- What are the prospects for sustainability?
- How durable or stable is the technology – how likely is it to change, and if it changes, will it displace the learning opportunity or require retooling?
- What are the "opportunity costs" – are there trade-offs, that might mean, for example, reduced funding for other programs because of technology costs; or limited access because the technology is not generally available?

Endnotes for Section Five

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58. Preliminary Report APC Women's Networking Survey - Initial Findings (September 1996)

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63. Lynne Alice. Women's Studies and the Net Effect (from Feminist Collections. vol. 17, no. 2, Winter 1996, - pp. 40-41)

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Section Six

Tools and strategies: Responding to the issues

Overview

As we have seen throughout this discussion paper, many factors affecting the issues around women's use of learning technologies are connected to structures and decision making at a range of levels, in public and private sectors, in capital cities, in educational institutions and in our own communities and homes. As well, the rapid changes in computer and communications technologies make it challenging to keep a current picture and to understand the implications of new developments.

In the midst of this sometimes overwhelming complexity, it is important to recognize that all these developments result from people making decisions, even though they are sometimes portrayed as the inevitable outcome of "technological forces". In many cases, these decisions take place in a context shaped by various levels of government policy. This means that it, is usually possible, as citizens, to follow the thread of decisions until we reach the level of public accountability. It also helps if we have a road map, a sense of the various components of the picture and how they interrelate. This section explores how we can develop our own road maps to the issues that affect women's use of learning technologies and how we can use those road maps to reach decision makers.

This section suggests some tools and strategies to:

- find and share relevant information that affect women's use of learning technologies;

- observe and keep track of developments that may affect the use of learning technologies;

- identify decision points about the use of technologies, at national, institutional and community levels;

- explore the values underlying decisions and consider their compatibility with feminist values and with principles and practices of adult learning;

- examine how and whether the use of new learning technologies meets standards of equality, such as those established in laws and Charter rights, as well as standards of fairness;

- identify appropriate action steps to convey concerns about potential negative impacts and to support initiatives with good potential for women's learning.

These suggested strategies can be undertaken by individuals, by formal and informal groups that share and coordinate tasks, and by networks of groups, using both conventional forms of communication and some of the new technologies that have been under discussion in this paper. There are already many examples of networks of women expanding the ways they use technologies for communication beyond phone trees to fax trees to e-mail, list serves, and computer conferencing.

Finding and sharing information

Keep a journal

The term "journal" is used here in the sense of "a daily record of events". Keep track of events, policy announcements, announcements of partnerships, funding allocations and so on, as they appear in newspapers, newsletters, electronic bulletin boards, and maintain a clipping file of those that are of most interest. One way to make this more manageable is to identify areas of interest among a group of people and set up a system in which each person keeps track of one area and keeps others informed of relevant items of interests. Develop a mechanism for sharing information, perhaps by preparing summaries of recent events and comments that can be circulated by letter, fax, computer mail, notices in relevant locations, and so on.

Keep in touch with the local picture and maintain a local perspective

As Menzies, Innis and many others have pointed out, the local picture is our ground, our touchstone for reality, against which we can test the outcome of strategies and initiatives. It is important to maintain a "local reality file" to document and share experience and information on the local level, both to support local initiatives and to contribute to the bigger picture.

For example, if your community has a learning centre, collect information about how it is used, by whom, and when: find out who is not using it and why, and assemble information that can support recommendations for improved access and usage. If there are initiatives that may affect your local access to learning, for example on the part of telephone or cable companies, or of educational providers, begin with local representatives to explore the potential impact on learners in your community, and follow up, if necessary, to identify the level at which decisions are made.

Use the local picture to contribute to a big picture

Information assembled from a number of locales provides a sense of the impact in the long run on large numbers of people of particular initiatives. Build connections with people in other parts of the country and other parts of the world to exchange information and observations. In the period before and since the Beijing Conference, there has been a significant development of connectivity–human and technical–among women, and this can provide a basis for continuing linkages that can enable people to contribute their reality and experience to the big picture.

For example, people in the far north of Canada can indicate how satellite and various radio and telephone transmission systems serve their needs for communication and information, and provide information about cost, reliability, appropriateness for learning, and so on, to those in other countries whose governments may be considering similar systems. There can be honest exchange of information about the appropriateness and usefulness of various technologies in particular contexts, based on the experience of users," and this information can used to analyze proposals to import technologies or systems from another county or region.

Find out what the true costs are

The costs of specific application of learning technology should include initial investments, capital and operating costs and time, The costs of staff time and learners' time are not always considered, yet represent important factors in accessibility and usability. Another often overlooked area of costs is what can be termed displacement- what cannot be done or paid for because the investment of time and or money is going into a technology based program. For example, find out if staff levels will be maintained, especially in important areas like counseling and student support, after new learning technologies are introduced.

Observe and keep track of developments

Keep a history

As John Ralston Saul notes, memory is "perhaps the first quality that differentiates us from the marketplace and from inanimate machines," [65] There are people among us, aboriginal people in particular, who value memory more than those who are planning only for the future and deny what the past may teach, Their respect for memory and for collective memory is also a respect for learning. Even on a functional level, our experience loses its value if it and the lessons learned are displaced from memory by the next new phase that comes along.

On quite a basic level, those with direct experience of previous educational technologies can bring their memories of those experiences to bear on current trends. For example, those who remember when community access television (CATV) was proclaimed to be the basis of citizen participation can recognize similar claims for the Internet and apply some of the lessons of CATV, such as the impact of corporate ownership and increasing monopolization on opportunities for genuine citizen direction of community television.[66]

For those with even longer memories, or an interest in the history of technology, there are historical examples of broader citizen participation in radio[67] and community broadcast uses of the telephone[68]. The stories of how these choices were eliminated by commercial monopoly interests and political decisions may offer a cautionary lesson for those who believe the Internet will inevitably lead to democratization of communication and information sharing.

Consider appropriate risk assessment strategies

Dale Spender has noted that women are more likely than men to assess risks before taking action, and suggests that although risk aversion may make women less adventurous about technology, it is "a positive advantage in our technological society", and notes that "this risk assessment factor is the quality factor, it is precisely what we have left out of our decision making processes in the technological context," Spender suggests that the picture of western technology might be very different if decision makers had asked these basic questions:

- What is it for?
- Do we need it?
- Can we afford it?
- Who will clean up the mess afterwards?[69]

Maintain a "reality check" file

Assess language, statements, claims, evidence, data against other information that is available from other sources. Analyze how information is gathered, and how statistical

information is changed and interpreted, for example in the transfer from Statistics Canada reports to a newspaper article. Examine the statements of policy makers, decision makers and politicians, for the basis on which statements are made.

For example, if a report states that "there are now 50% more women users of the Internet than there were 2 years ago," first of all, find out what that means. How many are there now; how many were there two years ago? What proportion of the whole Internet user population does that represent? How are "users" defined- are they those who have Internet accounts, whether or not they use them regularly, are they people who are on line every day, every week. every month? Where are the users- in urban or rural areas, in schools and colleges or in the community? Secondly, determine how that statement tallies with other available information, for example reports from Internet providers on the gender breakdown of their subscribers and their usage patterns. Unchallenged statements can continue to be repeated until they have the force of a truism, on which decisions are made.

Keep track of what works well and what doesn't

In formal education, evaluation and research are considered very important strategies for keeping track of how well innovations work, in order to guide decisions about whether or not to continue with a program, expand it or apply it in other situations, and under what conditions. Although evaluation has been portrayed as the domain of experts, evaluation is basically just well organized observations about experience.

Community based research strategies enable people with direct experience of a situation to record their observations and compile a picture that can be used to support decision making.[70] Learners, instructors and program coordinators obviously have valuable experiences to contribute to building a picture about particular programs and technologies, but so do others in the community–for example, those who could not participate in a program because of cost or access issues also have something important to say, and their story will be more likely included in a "community snapshot" developed by community members, rather than official institutional statistics that count only those who do participate.

Champion good examples

Keeping track of what works well and what doesn't can lead to the discovery of some very good examples of how technologies have been used to support learning that is appropriate, accessible, and meaningful. These mayor may not use the latest technologies, but demonstrate a good application, one from which lessons can be learned, one that may serve as a model or provide a framework that can be adapted for other situations. They demonstrate sustainability and can continue on an affordable and manageable basis even after any start up funding is no longer available. They meet stated evaluation standards

and address a defined learning need.

Documenting these examples and championing them achieves a number of goals. It can achieve visibility for a program so that it is less likely to be subject to cutbacks or elimination as long as the program continues to serve its purpose. It can provide positive feedback to planners and participants and develop their confidence, encouraging them to undertake other initiatives. It can illustrate what can be done with a given technology and by confirming the value of that particular technology for certain applications, can help support the sustainability of that technology.

For example, recent reports have (once again) predicted the phase out of audiotape, one of the most useful, user friendly and affordable technologies for learning. It is the one technology other than print that people can use themselves to develop learning materials in almost any situation. It is essential in language learning, and can be an important part of many other learning applications, such as learning technical skills where people are talked through an activity, or where the voice is an important part of learning, such as learning about counselling, music or speech. It has many applications in simple learning packages. Documenting some of these applications might serve to challenge the move to eliminate it as a technology, but it would take a very concerted effort and probably a demonstration that there was profit as well as social benefit in maintaining this technology.

Analyze the bad examples

This is the other sequel to finding out what works and what doesn't. Simply observing that it didn't work well is the beginning. The next step entails asking questions to pinpoint why it didn't work, so that it is possible to use this example for future decision making. It is useful to find out if the problem was intrinsic to the organizational structure or the technology, or was the result of circumstances that could be different next time.

Some examples of questions to ask: Why was the technology used in this case? Was the program well planned, in consultation with everyone involved, including instructors, learners, and managers? Was there enough lead time to put it in place? Was the technology appropriate for this context, and for this type of learning? Was the technology reliable? Did instructors or learners have difficulty using the technology? Could some of the negative outcomes be reduced or eliminated, for example, by using different strategies or by taking more time? Could some of the positive outcomes serve as a lesson for future action?

Identify decision points

Map out the connections

Sometimes it can seem very difficult to track down who makes decisions and how they are made. One useful strategy, (developed by a group originally named GATT-Fly, and now the Ecumenical Coalition on Social Justice) is called the Ah-Hah! seminar. Based on the "the assumption that people acquire a basic knowledge of how the political and economic system works through their own lives and experiences", this group process prompts people to map out the connections between their day to day lives and decisions that affect them, literally drawing a very large picture that links each level of activity and decisions.

Another way of finding out where and how decisions are made is to "follow the gold" -- find out where financial interests are, and what sources of funding are supporting a particular initiative.

Discover what the options really are

Often technologies are presented with unnecessarily limited options, like Henry Ford's description of color choices in Model T Fords -- any color as long as it's black. Early telephony could accommodate group discussions in a community, and was even used for broadcasts, but this option was eliminated by structural and technical decisions by corporations and governments by about the 1920's. Even now, there are a range of options for expanding the broadband access that is needed for increased use of computer and conferencing systems (ISDN, ASDL, cable, satellite, etc.) Some of them involve changes at a central point, some involve changes to entire infrastructures, such as the type of cable that carries the signal, some involve changes to how the cable is used and the signal is prepared for distribution.

As another example of decisions that may limit options is in the regulatory environment. Previously, under CRTC regulations, it was acceptable to support universality of access to phone service by averaging costs and revenues over an entire system, but the CRTC now stipulates that one component of service cannot be used to subsidize another component. This change is a political decision that may well result in whole categories of areas, for example, rural and remote regions, not receiving service because the cost of providing the service cannot be reasonably recovered by charges to subscribers.

But behind this decision is a range of possible choices, both technical and political, sometimes not evident at first glance, about what kind of technical systems to use, what groups of subscribers or types of service are considered when assessing cost recoverability, what policies are being used to govern specific rate structures, and so on. These choices are rarely exposed or explained in decision making, and tend to be addressed superficially in cover language, such as "everyone knows there have been cross-subsidies in phone service and now we're redressing that inequity". In this particular case, the costs of each service can be defined in a variety of ways, depending on the

accounting systems used and the ways that capital and operating expenses are accounted for.

Find out where the boat is going...

...and decide if that's your destination before you jump on for fear of missing it. We too are decision makers, but our decisions can be influenced by external pressures. There seems to be a sense of urgency to "not miss the boat", to not be left behind by a particular technology. For women, who have felt left behind by many technologies in the past, this is a particularly compelling argument. There can be pressure to not miss out this time, to have a chance to get in there and try to influence how things will work out before it's too late.

But each of us needs to take time to assess our own goals, and how any given initiative is related to it. Heather Menzies in *Whose Brave New World* argues for the need to take time to connect with each other in a personal way to reflect our own realities and share our perceptions with others so we can assess the broader implications of a particular direction in society.[71] Creating a sense of urgency, the exhortation to "act now", a standard tactic of both high pressure sales and of propaganda, is designed to prompt us to bypass our better judgment, circumvent considered thought and jump on the boat.

Explore underlying values

Question the values behind the statements

Question values and the validity of statements that are made. For example, the often repeated phrase that education is essential to give Canadian workers a "competitive edge in the new economy" has a number of value laded implications. If there is competition, it is accepted that there are winners and losers, which seems to represent a change in our perception that we want to be an egalitarian society that does not leave people as losers. If the term implies competition with other countries, then the implication is that other countries will be losers, which is again a change from a Canadian stance that less fortunate societies deserve support, not win/lose competition against them.

In the case of the values underlying the use of educational technologies, one could ask if the rationale for using a particular technology is to save money or to provide better learning. Some technologies, such as some of the conferencing technologies, favor those who are "quick off the mark" in responding, at the expense of those who wait and think: there are values about learners that support a decision to develop and maintain protocols to enable both the "talkers" and "thinkers" to have a chance.

In the field of education and training, these are many commonly used catch phrases that can be questioned, and if they are questioned, can lead to peeling away the assumptions and values behind a particular policy or action, in this case, the use of technologies for learning.

Check into what is meant by the terminology

This particular strategy is included under "exploring values" rather than "finding information" when it entails finding out about the frame of reference that shapes the meaning of a particular word or phrase. As Humpty Dumpty commented, 'When I use a word, it means just what I choose it to mean," and when challenged by Alice added the compelling argument of power. "The question is which is to be master -- that's all."[72]

For example, the term "knowledge workers" can mean a variety of things to different people. Depending on the context and framework of the person using the term, it can mean those who input information into databases, it can mean those who actually believe they know what's going to happen next: or it can mean those who work in jobs that require advanced education. By the same token, phrases such as "information economy" and "global market" are commonly used without explanation, but exploring their meaning can provide some idea of underlying values.

As another example, a new cable technology that claims to provide "two way communication" actually means one way transmission of information about products with just enough return bandwidth to enable subscribers to order the item.[73]

Relate new developments to Canadian equity standards and laws

Examine the access and equity provisions of new initiatives

One might expect that public policy initiatives for new technologies would require the same kind of provisions for equal opportunity and access for women, minorities, people with disabilities, that are required under law for many aspects of education, employment, housing and so on. However, there are examples of the introduction of new technologies where this is not the case.

The Community Access Program, sponsored by Industry Canada, invites communities for apply for grants of up to $30,000 to develop local community access sites to the Internet, but both the guidelines and the application form are silent on the subject of equal access, much less requiring that applicants demonstrate that they will make particular provisions to ensure the inclusion of equity groups.

This is in contrast to the example of the Commonwealth of Learning (COL), a Commonwealth organization begun in 1989 to support the development and sharing of open learning and distance education resources and technologies among member countries. This organization, based in Vancouver, Canada, and supported by all Commonwealth states, has established the principle that all projects supported by COL must demonstrate equality of access for women and men. This in turn develops awareness of the access issue in a whole range of applications of technologies for learning. For example, a computer awareness program in Luansha, Zambia, now automatically includes women in at least equal numbers in all its training programs. After only seven years of operation, COL has influenced a change in perspective in Commonwealth countries regarding women's access to learning by making this a requirement of funding.

Ask funders and decision makers about policies regarding equity provisions

The Commonwealth of Learning, like many other agencies, has demonstrated the effectiveness of the strategy of making equity in all aspects a condition of funding. A great many of the new initiatives in the use of learning technologies are supported by special funding arrangements. The same kind of equity provisions that most public sector programs require for women, minorities and persons with disabilities could be a condition of funding for projects related to the use of new technologies for learning. This kind of stipulation by funders can carry a lot of weight and establish a precedent which subsequently becomes part of the way things are done. This type of incentive has been successfully used by the federal and provincial governments to support equality of opportunity in the public sector, and the private sector has in many areas followed suit.

Develop a comprehensive definition of equity of access

Equity of access should include not just physical access, but access to training, childcare, transportation, affordability. For people with disabilities, it should include the equivalent of "cut curbs" i.e., designs that support universal accessibility, as well as specific support mechanisms that enable people to compensate for disabilities when accessing particular technologies. Equality of access should also include access without language barriers, for those whose first language is not English. This is especially important in the use of the Internet which is predominantly an English language system.

Identify action steps

Keep in touch

Find ways to link with others who are concerned about these issues, to provide information and support. Form alliances, develop connections among cross sections of groups; those interested in education, learning, training, those interested in learning technologies, advocates for users and decision makers. Exchanging information among disparate groups can itself be a form of education. Various movements, such as the women's movement or the peace movement, have accommodated diverse perspectives and values, as long as there was a sufficiently important common value to which everyone subscribed. If there is a common value among people concerned about the use of technologies for learning, there could be the basis for a wide network of concerned people.

Convey concerns to decision makers

Although we may sometimes feel that letters to political representatives are a very pedestrian means of conveying concern, the fact remains that this is a channel of communication that connects us directly with the political forum for decision making and one we need to use and keep open if we want to maintain healthy accountability. Even though there are now electronic means of communication by e-mail, experience so far indicates that a written letter appears to have a better success rate in obtaining a response. As well, there are occasions when exposing decisions in well-timed presentations to the media is a useful strategy - a fairly recent example is the protest of the cable companies so-called "negative option billing" that resulted in a reversal of private sector policy and a change in public sector regulation.

Support the positive initiatives

It is useful for decision makers at all levels to know that a particular program is working well. Sometimes, positive initiatives do not get the support they deserve until there is a danger they will be cut, and a good project can be vulnerable unless there are strong indicators that it is valued by those whom it was intended to serve. Letters of appreciation, informal feedback and active participation in meetings to discuss projects can all be used to indicate support.

Keep on asking questions

Some of the questions listed at the end of each section in this paper can serve as "starters" for further explorations of issues related to new learning technologies and women. You are invited to continue exploring the issues and to add questions of your own.

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66. Kim Goldberg, The Barefoot Channel: Community Television as a Tool for Social Change, New Star, Vancouver, 1990

67. John Stevenson, The Silencing of a Democratic Medium: Early Public Policy on Radio and the Regulation of the Internet, paper presented at INET 1996.

68. Michelle Martin, Hello Central? Gender, Technology and Culture in the Formation of Telephone Systems, McGill-Queens, 1991

69. Dale Spender, The Internet as a Networking Tool for Women, keynote address to the International Meeting of the Women's Network for Vocational Education and Training In the Asia Pacific, July, 1996.

70. Two examples of books that offer guides to popular research are Rick Arnold, Deborah Brandt, Bev Burke, A New Weave: Popular Education in Canada and Central America, CUSO/OISE, 1985 and GATT-Fly, Ah-Hah, A New Approach to Popular Education, Between the Lines, 1983

71. Menzies, op, cit, p. 138,139

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Conclusion

What's next: A highway or a community?

This discussion paper presents more questions than answers. This is deliberate, because the intent of the paper is to promote further exploration of some of the issues identified so far. It is also unavoidable, since the area of the application of new technologies to learning still has many unanswered questions. But it is not too soon to become engaged with this issue, since many deliberations are now underway that will affect whether or not new technologies really will provide accessible and meaningful learning opportunities. However, keeping in touch with this issue will require considerable tolerance for uncertainty, some occasional detective work to find out what is actually happening, and a commitment to discerning reality in the midst of continually evolving terminology.

There have been earlier references to the pressure to "not miss the boat", to not be left behind by technological developments. Rather than use a transportation analogy, with its implication of leaving one place and arriving at another, it may be more helpful to use an analogy of a community.

A livable community develops from planning processes that take place over time, in which patterns of growth accommodate a range of human activities, yet leave room for some spontaneity. It takes time, a vision, and commitment to develop a community. It takes input from a broad range of interests, but has a process where no single interest predominates. It takes recognition of factors that cannot speak for themselves - the natural environment, future generations. In this context, people who are new to the situation have as equal a right to input as those who have been there for a long time, because, as one new rural resident once put it. "It's not a question of how long I've been here, but of how long I plan to stay." Learning, like growing up in a neighborhood is not a one time activity, but a continuous part of life. The impact of technological systems tends to remain, even after specific technologies have moved on. Therefore, we can all say that we will be staying awhile in a context that includes both learning and technology, and that we all have a right to speak.

This image of a planning process involved in building a livable community offers an alternative to the concept of a high speed chase down the Information Highway. It recognizes the value of taking time to think about things, about setting up patterns that promote usability and livability, of building in flexibility and recognizing the importance of supporting human connectedness. Can we do this with new learning technologies?

It is hoped that the activities that follow from discussion of this paper will help those concerned with women's learning to participate in the shaping of decisions around policy, financing, technical standards, and approaches to teaching and learning; critical factors in determining how well learning technologies achieve their promise.

Glossary

Adult Education. The field of education that serves adult learners and includes formal programs, such as post secondary credit courses or continuing professional education, and nonformal programs, such as workshops, and workplace training

Adult Retraining. Usually refers to a program to enable adults to develop new job-related skills that are in demand in the workplace

Adult Upgrading. Programs that enable adults to fill in the gaps in their earlier education, particularly in the areas of literacy and numeracy

Adult Basic Education (ABE) Programs that enable adults to develop basic literacy and numeracy skills, to the level normally attained at the completion of elementary school

Asynchronous communication. Refers to communication in which the sender is transmitting the message at a different time than the recipient is receiving it. For example, a letter sent through the postal mail is received some time after the writer sends it.

ATM Asynchronous Transfer Mode. A high speed networking technology for broadband communications

Audioconferencing. Telephone based conference that includes more than two sites: often sites are linked by a bridge or series of bridges that interconnect sites so that all participants can hear and speak to each other.

Audiographics. A computer based system that provides computer generated graphics over telephone lines, to accompany voice messages provided by audio conference

Broadband systems. A range of communications services that require more bandwidth than traditional voice messaging. Broadband can transmit video images, and data, as well as sound.

Cable system. The system of delivering television signals to homes through a series of satellite receive dishes that are connected to a local network of co-axial (high capacity) cable.

Canadian Radio-Television and Telecommunications Commission (CRTC) The Canadian government agency that develops and enforces regulations governing broadcasting, cable and telephone systems, in accordance with policies developed by the federal government.

Computer Conferencing. A computer-based discussion system which enables participants to contribute written ideas, then transmitted as computer mail. Conferencing software sets up discussion topics and linkages so that participants can follow the threads within a discussion, or begin a new discussion on a related topic.

Computer Hardware. Generally refers to the computer equipment, such as the processor, keyboard, monitor, printer, connecting cables.

Computer Software. The electronically coded systems that "drive" the computer, and enable it to do specialized tasks, such as word processing, communications, drawing, and so on.

Continuing Education. Usually refers to forms of education for learners beyond the age of the cohort who complete their education in a continuum from elementary school to graduation. Continuing education can include programs related to professional training, formal credit programs, or interest courses.

Distance Education. A form of education in which learners and instructors may be in different locations, and be linked by various forms of communication, including print

correspondence, telephone, teleconferencing, videoconferencing, computer communications. Learning materials may be provided in different media, including print, audiotape, videotape, computer based materials.

Educational Technologies. Refers to the group of technologies that can be used to support education. Depending on the context, educational technologies can include everything from blackboard and chalk to computer conferencing. In discussions about "new educational technologies", the term usually refers to electronically based systems for communication and information transfer, such as audio conferencing, audio graphics, videoconferencing, electronic mail, computer conferencing.

Educational Providers. Organizations, institutions and agencies that provide educational programs.

Electronic mail (e-mail). A communication system whereby a computer user can prepare a message and send it, using the electronic connections provided by a system such as Internet, to a computer user that is connected to the same system.

Formal education. Education offered by public or private educational institutions that follows specific courses or programs and provides recognized accreditation.

Freenet: An Internet server, usually organized on a cooperative basis by members, that provides Internet access to its members on a free or low cost basis.

Full time enrolment. The total number of students who are enrolled full time at an educational institution. Post secondary institutions may have different definitions of what constitutes full time study, in many cases it includes learners who take more than three courses in one term or semester.

Information Highway. Sometimes called the electronic highway. Refers to an advanced information and communications infrastructure that is expected to become a "network of networks" linking businesses, homes, governments and institutions, and provide a range of services including entertainment, education, cultural and social information, databanks, computing, electronic commerce, banking and business services. (Adapted from The Canadian Information Highway, Industry Canada, 1994)

Internet. A network of networks that links computers and enables transfer of information and, communication worldwide.

Internet Service Provider. An agency that has the hardware, software and communications systems to provide the bridge that links local computer users to the Internet.

Lifelong learning. A concept that learning can be expected to continue throughout human life, in response to identified learning needs that relate to training, interest, or skill development.

Modem A computer accessory that allows computers to communicate through telephone lines, converting data into the digital language of computers.

New Educational Technologies "New educational technologies" or new learning technologies usually refer to electronically based systems for communication and information transfer, such as audioconferencing, audiographics, videoconferencing, electronic mail, computer conferencing that can be used for educational purposes.

Non formal learning. A learning experience that does not lead to a specific accreditation. Non formal learning can include a range of situations, from interest courses offered by educational providers, to an individual's learning project pursued for personal interest.

Open learning. A system that provides more flexible access to learning than is usually available through conventional classroom-based instruction. It can include a variety of strategies, such as materials that learners use at home, access to tutorial help on a "drop-in" basis: computer programs that learners can access at a local centre at their own convenience.

Part time enrolment. The total number of learners who study part time, as it is defined by the educational institution; in many universities, includes those who are studying three courses or less in a given term or semester.

Post Secondary Education. The post secondary system in Canada comprises universities, colleges, university-colleges, technical institutes.

Real time Transmission. The transfer of data, voice or video images so that the sender is transmitting it at the same time that the recipient is receiving it. For example, a telephone , conversation happens through real time transmission, but a message sent by computer mail does not require the recipient to pick it up while it is being transmitted.

Satellite Transmission. Sending data, voice or images by means of an electronic signal that is beamed from an large transmitter, called an uplink, to antennas on a geostationary satellite that is moving at the same speed as the earth's rotation and is thus in a fixed position over a specific region of the globe. The signal is then transferred from the satellite's antenna to satellite receive dishes on earth.

Training. Programs that are focused on skill development that enable learners to attain trade or professional qualifications, or to meet the skill levels required of a specific type of job

Universal Education. The principle that all members of the population have the right to education to a certain specified level, and/or between specified ages.

Videoconferencing. A system of transmitting video and sound images between two or more sites that enables participants at all sites to see and hear each other. The signal may be transmitted by satellite or by land lines, usually through the telephone system, depending on the equipment and networks available in a particular region.

World Wide Web. A system that uses the Internet for providing access to a wide range of information by linking documents that can include texts, graphic, sounds. An individual or organization provides information in a format especially designed for the web on what is called a Webpage. Software, known as search engines, enables users to find sites using keywords or phrases. The process could be compared to looking through a giant encyclopedia with pictures, with pages contributed from people all over the world.

Annotated Bibliography

These are recommended resources for those interested in learning more about the issues related to new learning technologies and women's learning.

Overviews of the social, political and economic context

Ursula Franklin, *The Real World of Technology* , CBC Massey Lectures, Anansi, Toronto, 1990. A commentary on the ways in which technology interacts with social, economic and political dynamics, including reflections on historical uses of technology and suggested ways of regarding technology that are an alternative to its unquestioned acceptance.

Heather Menzies, *Whose Brave New World: The Information Highway and the New Economy, Between the Lines* , Toronto, 1996. A commentary on the drive towards introducing new information technologies to displace workers and to implement a corporatist agenda; presents an alternative perspective on what is called "the technological imperative" and recommends strategies for responding to the social, economic and political dynamics that support this imperative.

John Ralston Saul, *The Unconscious Civilization*, CBC Massey Lectures, Anansi, Toronto, 1995. Explores the ways in which the accepted notions of our society as a democracy directed by individuals is at odds with the reality of a corporatist agenda that is colonizing decision making at all levels of political and economic life.

"Seduced by Technology: The human costs of computers". *The New Internationalist*, No. 286, December, 1996. An issue dedicated to exploring the impact of the new technologies on people worldwide.

Guides and commentaries on the use of learning technologies

A. W. Bates, Technology, *Open Learning and Distance Education*, Routledge, London and New York, 1995. Designed for educators and planners, outlines the main organizational issues in open and distance learning and presents the educational, organizational and economic factors that influence decisions about selection of technologies and teaching/learning strategies.

Council of Ministers of Education, *Distance Education and Open Learning: A Report,* Occasional Paper # 1, Toronto, 1995. Provides a snapshot of open and distance learning in Canada at the elementary, secondary and post secondary levels, presents some cases that demonstrate key issues in the field.

Judith Roberts and Erin Keough, eds, *Why the Information Highway: Lessons from Open and Distance Learning*, Trifolium, Toronto, 1995. A collection of essays by experienced educators in open and distance learning that addresses theoretical and practical issues of primary concern for educators, learners and users of educational technologies.

Writings on women's learning and technology:

Elizabeth Burge, "Learning in Computer Conferenced Contexts: The Learners' Perspective", *Journal of Distance Education*, Vol, X1, No 1, Spring, 1994. Summarizes the results of qualitative research about learners' responses to using computer conferencing as the primary medium of communication among learners and instructors.

Elizabeth Burge and Helen Lenskyi, "Women Studying in Distance Education: Issues and Principles", *Journal of Distance Education,* Vol, V, No. 1, Spring, 1990. Describes a women's studies courses offered through educational technologies and using learner-centered principles.

Dianne Currie, "The Construction of Gender at UBC Computing Services", *Feminist Collections.* Vol, 17, No. 2, Winter, 1996. Describes different approaches, based on gender, to the use of computers and to the provision of computer user support services at the University of British Columbia.

Gill Kirkup, "The Importance of Gender as a Category in Open and Distance Learning", keynote address at *Putting the Student First' Learner Centered Approaches in Open and Distance Learning*, Open University East Anglia, Cambridge, 1995. Outlines some of the issues that are highlighted when documenting women's experiences in using new learning technologies in open and distance learning and in other settings.

Susan May, "Women's Experience as Distance Learners, Access and Technology", *Journal of Distance Education.* Vol, X1, No. 1, Spring, 1994. Describes the responses of women distance learners to their experience and points out the importance of distance education in providing access to learning, even though women still faced other challenges, such as limited time.

Christine von Prummer, "Women-friendly perspectives in distance education", keynote address at conference on *Feminist Pedagogy and Women Friendly Perspectives* in Distance Education, Umea, Sweden, 1993. Outlines research and observations about the application of feminist pedagogical principles to distance learning programs, noting that social learning features were important to many learners.

Leslie Regan Shade, "Being Digital and Domestically Challenged: A Gendered Perspective on Access", chapter in PhD thesis, *Gender, Community and Social Constitution of the Internet*. Highlights some of the more important considerations that relate to women's access to and use of Internet-based communication.

Leslie Regan Shade, "Women, the World Wide Web, and Issues of Privacy", *Feminist Collections*, Vol. 17, No. 2, Winter, 1996, pp. 33-35. Addresses issues related to personal safety, trust and privacy that arise with the use of an open communication system such as the World Wide Web.

Ongoing Resources (Web and print based)

Alliance for a Connected Canada is an association committed to ensuring access to communications technology. Network Canada Alliance: http://www.global.com/connect

Canadian Women's Internet Association: http://www.women.ca/

Feminist Collections: A quarterly of women's studies resources. Published by University of Wisconsin System Women's Studies Librarian, 430 Memorial Library, 728 State St., Madison, WI, 53706, and available on WWW. Usually includes some articles about women and technology: Vol. 17, No. 2, Winter 1996 is a special issue, on Women's Studies and Information Technology: Reports from the Field http://www.library.wisc.edu/libraries/WomensStudies/fcmain.htm

Information Highway Working Group: IHWG's states is mission as follows: "Canada has a history of turning communications technologies into a tools for national cohesion. It also has a history of making sure that everyone has access to these tools. The IHWG is working on policy alternatives to ensure that this historical legacy makes it onto the information highway". http://www.nawgits.com/

Women'space, print and web based newsletter produced in Canada and designed "to promote accessibility to the Internet, its tools, information and resources; enhance the effectiveness of women's organizing through national and global connections; bring global online resources to local community actions; support the exchange of ideas and experiences and amongst women and women's groups." (Women'space masthead) http://www.softaid.net/cathy/vsister/w~space/womspace.html

Women's VET Network (WINVET-Women in vocational and technical training in Australia) : http://sunsite.anu.edu.au/

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