

The Social Impacts of Information and Communications Technologies (ICT)

**Prepared for the SchoolNet Program
Industry Canada**

**Prepared by Marc Belanger
in collaboration with TeleLearning Network of Centres of Excellence**

September 13th, 1999

Table of Content

Introduction	1
1. The Major Trends: Globalization, the Knowledge Economy and Computer Communications	1
1.1 Globalization	1
1.2 Computer communications being adopted by Canadians	2
1.3 Canada is becoming a knowledge-based society	3
2. The Challenges of Increased ICT	4
2.1 Access	4
2.2 Privacy	4
2.3 Groups at Risk	5
2.3.1 Persons with Disabilities	5
2.3.2 Women	5
2.3.3 Aboriginal people	6
3. The Benefits of ICT	6
3.1 Increased employment and educational opportunities for young people	6
3.2 A strengthened educational system	6
3.3 More opportunities for training in the workplace	7
3.4 ICT could help build Canadian unity while supporting regional diversity	8
3.5 ICT helps improve equal access to learning	8
3.6 Computer communications could develop better-informed citizens	8
3.7 ICT could produce better-informed consumers	9
3.8 Opportunities for marketing Canadian good and services internationally	9
Conclusion	10
Endnotes	12

The Social Impacts of ICT

Canadians are facing great opportunities and challenges as globalization, the development of a knowledge-based economy, and advances in computer communications increase. The opportunities include larger markets for Canadian firms (especially small and medium sized enterprises) greater access to employment possibilities and increased citizen participation in the affairs of the country. The challenges include threats to privacy and the potential marginalization of groups such as women, persons with disabilities, seniors and aboriginal peoples. The key to maximizing the potentials and successfully confronting the challenges is an educational system which allows people, no matter where they are in the country, access to education and training throughout their life-time. Computer communications can provide access to life-long learning which can help Canadians become *creators* of knowledge on the information highway instead of just consumers. Young Canadians, given access to the technology, education and training, could become leaders in the new knowledge-based global economy of tomorrow.

1. The Major Trends:

Globalization, the Knowledge Economy and Computer Communications

The major trends which are reforming Canada's, and the world's, social and economic activities include increased globalization (which is producing a global marketplace), the development of a knowledge-based economy (which is founded on the creation of knowledge), and advances in computer communications (which are expanding at ever-increasing rates).

1.1 Globalization

Economic activity is no longer tied to geography. Canadian firms - large and small - are competing in a global marketplace where Tokyo is as accessible as Toronto. More than \$1 trillion dollars is being traded on the international markets every single day.¹ The result is an international economy which demands that countries have sophisticated computer communication infrastructures and educated workforces which can successfully confront constant change.

The advent of this global marketplace provides opportunities for selling Canadian goods and services throughout the world, especially for small and medium enterprises. SMEs create most of the jobs in Canada. Since 1983 they have been virtually the only net generator of jobs in the economy and account for almost 60% of the country's economic output.² By encouraging entrepreneurs and educating employees of small enterprises, Canada could take advantage of global opportunities in order to produce more jobs and maintain its economic and social well-being. These entrepreneurs and employees will need to be adept at the use of computer communications not only to use the technologies effectively, but also to uncover creative economic and social opportunities within them.

A particularly serious challenge posed by globalization is the threat of tidal waves of foreign content drowning out Canadian voices on the information highway. The Internet, for example, has only about 3% French content³ - which poses problems for our francophone communities. Most of the material on the Internet is generated by the United States and Britain - both of which are implementing educational programs to assure and increase their market share of Internet activity.⁴ Canada, if it is to maintain its cultural identity, must create content which reflects its particularly Canadian personality. That means Canadians producing services on the information highway for other Canadians. And that can only be done if Canadian online creators are nurtured by an infrastructure which recognizes the value of educating and training people in online activities at the start of their education and throughout their lives.

1.2 Computer communications being adopted by Canadians

Increasingly more powerful computers and computer communication systems are showing signs of melding into an information highway which will carry vast amounts of information in the form of text, images, graphics, animation, audio and video. The author of Moore's Law (which estimates the doubling of computer processing capabilities every 18 months) suggested recently that his estimate will remain valid for another 15-20 years.⁵ This means today's elementary students, by the time they are old enough to graduate from university, will be expected to work with computers which are hundreds of times more powerful than current ones. They could have personal computers equivalent to today's supercomputers. Meanwhile some analysts point out that bandwidth capacity is currently tripling every 12 months and will continue to do so for another 20 years.⁶

The Internet - which is being seen as a prototype for the information highway- is being used to create new businesses, unite communities of interest, provide news, promote new avenues of political activity, link organizations and individuals around the globe, provide access to government information and support new methods of education.

All indications are that the Internet is being used increasingly by more and more Canadians. A recent Statistics Canada survey indicates that in 1998 39.9% of Canadian households had at least one regular user of the Internet (accessing from either work, home, school or library).⁷ Access to the Internet from the workplace and home were almost equal with 23.3% of regular users accessing from work and 22.6% from home. Remarkably, access from home jumped more than six percentage points from 1997 to 1998. Internet access from libraries remained quite low at 4.3%. Access to the Internet from school - the third most popular option - also showed a dramatic increase. In 1997, 9.4% of regular users accessed the Internet from school. In 1998, that figure had increased by 31.8% to 12.1%. This may be evidence that programs such as SchoolNet are having a significant impact.

As Canadians adopt the Internet they are increasingly using it for education. Fully 30% of the regular users of the Internet in 1998 used it for educational and training purposes.⁸ This is related to the use of the Internet for homework and self-employed people searching for training

materials (22.9% of the regular users in 1998 used the Internet for self-employment⁹).

Almost a quarter of the regular users in 1998 (21.6%) used the Internet for distance education.¹⁰ This may be partly due to the increased attention Canada's educational institutions are paying to Internet-based educational programs. The New Brunswick government's TeleCampus project has been tracking online courses internationally and it reports that 17% of the 16,000 courses in its database are Canadian.¹¹ A study at York University of its students taking online courses showed that they achieved significantly higher grades than in-class students.¹²

At the same time companies are adopting the Internet for education and training. In a 1997 survey of human resources development executives many respondents said they were planning to implement learning technologies based on computer communications. Some 40% reported that they had used the Internet for training during the past year.¹³

As well, Canadians are using the Internet for health-related purposes. In 1998 42.5% of regular users of the Internet used it to search for medical information.¹⁴ The Internet could prove extremely valuable as the country encourages more preventive health care in order to contain health costs.

1.3 Canada is becoming a knowledge-based society

The information highway is being introduced into a society which can already be described as being information-based. Over half of Canadian occupations are based on the manipulation of information and the percentage has been growing. In 1971, 44.1% of occupations could be classified as being held by information workers. By 1996 the percentage had increased to 55.3%.¹⁵ Meanwhile, there has been an increasing trend towards the employment of knowledge workers. While total employment in Canada grew at an annual rate of 2.1% between 1971 and 1996, the knowledge worker classification increased by 4.1% annually.¹⁶ Given this rate of increase, some analysts suggest that Canada is developing a knowledge-based economy.¹⁷

The distinction between an information-based economy and a knowledge-based economy is important to consider. The crucial difference is that information can be easily codified and manipulated by computers; knowledge, because it is essentially a creative process, needs people to produce it. The information-handling capabilities of computers are why the Canadian economy saw a dramatic drop in the numbers of clerical workers when microcomputers were introduced.¹⁸ If we introduce more ICT into Canadian society will we lessen the need for people to be information-manipulators? That much seems a safe assumption. Will we at the same time increase the number of knowledge workers and people working to support knowledge workers? That is a much more difficult question. The answer may lie in the development of more Canadians adept at the use of computer communications for creating knowledge.

Knowledge workers need access to information, education and training in order to create knowledge. Some may be able to take extended periods of time off work to better educate and train themselves. But most will need to educate themselves and access information while they are working. The information highway - if people are trained to use it - could provide convenient access to education and information via modular distance-based courses. It could support people wherever they are based - large cities, rural areas, or economically-developing regions. It could provide people who want to work part-time at home the ability to find employment. And it could help persons with disabilities find jobs while working from home or other workplaces. There is little doubt that information highway will become a necessity for knowledge workers.

2. The Challenges of Increased ICT

While the advent of the information highway provides opportunities it also poses challenges such as access to the technology, threats to privacy and the potential of marginalizing groups such as women, persons with disabilities, and aboriginal people. The best way to meet these challenges is to develop computer fluency amongst Canadians.

2.1 Access

The two major issues related to information highway access are affordability and accessibility. A Statistics Canada analysis suggests a very strong relationship between household incomes and the use of computer communications. While 65% of households in the top 25% income bracket regularly used computer communications in 1998, the bottom quartile had a penetration rate of only 13.2%.¹⁹ Clearly, affordability will be crucial to equitable participation on the information highway. Lower income families simply cannot afford computers and computer communication services. Unemployed people, who could take advantage of the Internet for researching job opportunities and finding online employment, are less likely to be able to afford computers at home. And many schoolboards in the country are struggling to find the funds to provide computers and access to the the Internet. Consequently, programs such as SchoolNet, which provide access for young people at school and to people in the community, are crucial if the nation is not to suffer from further polarization between high income users with access to ICT and lower-income users with little or no access.²⁰

Accessibility questions are also important to consider. Forty percent of households in Canada's 15 largest cities had a regular Internet user, compared to 30.1% outside the large cities.²¹ This is most probably related to a lack of Internet-infrastructure in rural areas. Schools linked to the Internet via programs such as SchoolNet may be the only access for young people outside the large urban areas.

2.2 Privacy

An increase in ICT could also pose serious problems related to privacy. Individual control, freedom of choice and self-determination could be adversely affected.²² Threats to

privacy have been traditionally linked to the possibility of governments merging databases such as income tax and health care. But an even greater threat stems from businesses recording massive amounts of transaction-generated information. The creation of very detailed dossiers on consumers - to which they may not have access - is very real.

The best protection against the abuse of privacy is an informed user community which can lobby for protective legislation, be aware of potential abuses and help develop software tools which will protect, not threaten, privacy. The development of this informed user community is predicated on the education and training of Canadians in the use of computer communications.

2.3 Groups at Risk

Some of the groups which have been identified as being at risk of marginalization by the introduction of the information highway include persons with disabilities, women, and aboriginal people.

2.3.1 Persons with Disabilities

Persons with disabilities make up about 15% of the Canadian population and the percentage is growing.²³ A study by the TeleLearning NCE pointed to a number of factors which influence the ability of people with disabilities to achieve learning goals including: customizing programs to meet individual needs, training people with disabilities to act as trainers, ensuring access to computer communication networks, providing tools for communication and expression, and providing employment possibilities.²⁴ Computer communications could dramatically increase the possibilities for disabled people to have access to education and work.

2.3.2 Women

It is generally agreed that women's participation on the Internet is lower than the rate of male participation but precise figures are difficult to come by because more than one member of a family may use the Internet. However, there are indications that the Internet could attract more women users - if they were introduced to it. Don Tapscott, the author of "Growing Up Digital" has pointed out that the Internet, with its chat rooms and email capabilities, may be more suited to the learning styles of girls who are more oriented to building individual relationships and communities of interest than boys.²⁵ In a study of the use of computer communications for education by the TeleLearning NCE 81% of women reported a positive experience as compared to 77% for men.²⁶ However, major factors still have to be addressed, such as the lack of software directed at women, the scarcity of role models for women, and a cultural bias against women becoming adept at computer technology. School programs which target young women may increase their access to, and expertise with, ICT.

2.3.3 Aboriginal people

Canada's aboriginal peoples face major challenges in using the information highway because of limited access, lower income levels and educational attainment. A much larger percentage of First Nations people have less than grade 9 compared to the general Canadian population. Only three per cent of aboriginal people have degrees²⁷. But there are signs of improvement. There were nearly 27,000 Indian and Inuit students enrolled in post-secondary institutions in 1994-1995, as compared to 8,000 in 1983-84.²⁸ As well, government programs such as SchoolNet have paid particular attention to aboriginal people. By November 1997 355 First Nations schools were involved in SchoolNet for access to the Internet and help with content development.²⁹

3. The Benefits of ICT

The benefits to Canadian society of a sophisticated ICT infrastructure, and people trained to use it creatively, include opportunities for life-long education, new job opportunities, cost-effective training programs and more, including the strengthening of Canadian identity. The information highway could help make Canada a learning society - a society in which Canadians access life-long learning in order to improve their employment potential, become better-informed citizens, participate in cultural activities, enjoy healthier lifestyles, and build lasting relationships both nationally and internationally.

3.1 Increased employment and educational opportunities for young people

Most young people are reacting to the realities of the new work-world by extending their time in formal education and lengthening their transition into the work-world. The typical school-to-work transition period has increased by two full years since the mid-1980s.³⁰ It is no longer the traditional two steps of first education, then work, but a continuing process of moving into and out of the workforce and formal education. Most understand that education and work experience will provide them with the flexibility to react to the constant technological change of a knowledge-based economy. Access to education and training via the information highway while they are employed may become an attractive option. Or, while they are in school, the information highway could provide them with opportunities for part-time jobs, telework or self-employment. By becoming fluent in the use of computer communications as they are entering the workforce they could build skills which will help them become life-long learners on the information highway.

3.2 A strengthened educational system

The grounding for a knowledge-based society is best developed in the early years of life-long education when students are more receptive to new ways of using technology. This demands programs such as SchoolNet which can help develop computer communications fluency.

Computer communications could help build increased links between educational institutions and society. Scardemela and Berieter, professors at the Ontario Institute for Studies in Education (U. of T.) and leaders in the TeleLearning NCE, have been working on using computer communications to link elementary schools with the outside world by building knowledge-creating computer communication systems. In a paper about their efforts they write: "Imagine a network of networks - people from schools, universities, cultural institutions, service organizations, businesses - simultaneously building knowledge within their primary groups while advancing the knowledge of others. We might call such a community network a knowledge-building society."³¹

By engaging learners (no matter where they might be or what educational attainment they may have) in online knowledge-building and learning interrelationships, the country might encourage more young people to stay in school, help those who want to return to get their high school diplomas or post-secondary credentials (at no matter what age), and improve employability skills by providing greater access to training. As well, educational institutions could strengthen themselves by having access to a wider community of learners, share common courses, and find teaching personnel or resources from anywhere in the country or even the world.

3.3 More opportunities for training in the workplace

Training is a key factor in building a knowledge society. Rapid technological change means people have to be involved in a continual process of upgrading their skills. However, a 1993 survey showed that 72% of Canadians did not take part in training. Fewer than 20% of people in their 20s who had not gone beyond high school were involved in any job training.³² Those who did participate in training were disproportionately already high-skilled. And those working in small firms or non-standard work had little access to training or lacked the means to finance it.³³

However, new information and communication technologies are showing signs of providing greater access to training as a diverse range of commercial and non-commercial training providers are developing. More firms are increasingly being attracted to online training programs. (A study by the TeleLearning NCE on the cost-benefit of Web-based training at Bell Canada showed that despite higher start up costs online training could save money for organizations with training needs similar to Bell.³⁴) Meanwhile, small companies which cannot afford in-house training programs are finding cost-effective just-in-time training programs on the Internet (from companies such as McGraw-Hill Online Learning, ZDU and Asymetrix Learning Systems as well as publically-funded educational institutes.). Increasingly, individuals are realizing that they have to take personal responsibility for up-gradng their skills, possibly via online courses which they can take while remaining employed or available for new jobs. The information highway could provide the means for helping individuals and firms commit themselves to life-long learning strategies, the key to building a knowledge-based society.

3.4 ICT could help build Canadian unity while supporting regional diversity

The information highway allows for both national and regional development. Local initiatives can be supported via the information highway by encouraging homegrown entrepreneurial activity, access to regional cultural activities and participation in local community affairs. At the same time, because of the information highway's ability to link people no matter where they live, it could contribute to national unity. People in different areas of the country could build personal relationships, participate in shared cultural activities, share strategies for building community-based projects and, most importantly, learn together. By collaborating in educational activities, people across the country could learn from each other while maintaining their regional base and unique characteristics. As well, small communities scattered around the country such as francophone communities could build lasting linkages which could help them develop locally as well as building their ability to influence national debates.

3.5 ICT helps improve equal access to learning

Canada has one of the best educational systems in the world. However, work still has to be done in providing more equitable access to education. People in rural or remote areas do not have access to the educational opportunities available in the larger cities. Disabled students who have difficulty leaving the house do not have available to them the range of educational opportunities others do. French or English students living in minority communities may not have access to sufficient learning resources in their language.

The information highway could help provide those groups, and others, gain more equitable access to education, training and information. By linking them to educational opportunities outside of their immediate area the information highway could provide them not only with equitable access to education, but also give them opportunities for using that education for employment, social, political and cultural activities.

3.6 Computer communications could develop better-informed citizens

In 1998 regular users of the Internet reported that they spent 36.4% of their online time searching for government information. For users spending more than 10 hours a month on the Internet this percentage rises to a remarkable 75.9% - which is even higher than the rate of usage for email.³⁵ Undoubtedly the information highway will change how Canadians are governed and how they will want to be governed.

Already ICT is changing how the federal government, city councils, legislative assemblies, provincial governments and public regulatory bodies are acting.³⁶ They can provide more information in easily accessible forms and receive feed-back from their constituents. New models of political activism are being developed as citizens learn how to band together on issues electronically. ICT has the potential for involving citizens in new and powerful ways which could lead to greater democracy and government responsiveness to Canadians.

However, a number of analysts have pointed to negative possibilities. If 75% of information highway users are searching for government information online, it is a small step for them to demand online instruments for influencing their elected representatives. This could lead to "instant polls" and more demands for "direct democracy". On the surface these may look appealing in our attempts to make Canada's democratic institutions more responsive. But they also raise the possibility of lobby groups influencing polls in the short term and demanding quick action by legislators. New polling mechanisms could promote a tyranny of the majority.

The key to minimizing the potentially negative effects of the information highway's encouragement of new methods of governance is a better-informed community of online users. By educating people in all the implications of the information highway positive and negative - Canadians could make more informed choices in how they want to use the new technologies. This education in online effects would be better started in schools as part of civics classes and then expanded to the general public. Becoming informed online users would lead to better-informed Canadian citizens.

3.7 ICT could produce better-informed consumers

The information highway is producing new opportunities for commercial activity in which Canadians will want to participate. Being educated in the activities of online commerce will help Canadians not only participate but increase the commercial potential of the information highway. At the same time however, as new commercial activities are developed, there is potential for consumer fraud and threats to privacy, as well as misinformation being recorded in files such as credit ratings. The best way to minimize the negative effects new commercial activities may have is to educate people in how the technology works and their rights. The information highway could be used not only to promote new commercial activity but also to provide basic consumer information resulting in better-informed consumers.

3.8 Opportunities for marketing Canadian good and services internationally

Canada is well-positioned to become a leading producer on the information highway not only for domestic consumption but internationally as well. Analysts have pointed out that if the country could obtain for itself more than a three per cent share of the global highway-related services and products market, it could be a net exporter.³⁷

For example, one market which is not currently being exploited to its fullest is the development of French-language related material. Only about three per cent of the material on the Internet is in French. Canada could use its French-language talents to produce and market French material around the world.

Another source could be the marketing of educational programs. Not all countries have Canada's expertise and educational resources. Many might want to access online programs developed with Canada's experience in educational activity and modified for their needs. A study

by the TeleLearning NCE has shown that there is a potential for educational programs to be marketed internationally.³⁸ Canada could be a leader in educational activity on the global information highway.

However, in order to do so, the country needs an educated and trained workforce which is creatively fluent in using computer communications. The best way of ensuring the development of this workforce is to promote the education of young people early in their life-long learning careers.

Conclusion

Canada is facing a number of powerful trends as it enters the new century including increased globalization, the growth of a knowledge-based economy and the advent of powerful computer communication systems being used by more Canadians. These trends provide many opportunities for new commercial, educational, social and political activities which could benefit Canadians. At the same time, they pose challenges which must be addressed if all Canadians are to participate equitably and effectively in the information highway. The key to maximizing the benefits while successfully confronting the challenges is a strong educational system which includes opportunities for Canadians of all ages, no matter where they are in the country, to access the new technologies and learn how to use the information highway creatively.

The opportunities include new potentials for increasing the stock of good jobs in the country (especially by small and medium enterprises), more democratic forms of governance, better access to preventive health care information, and new possibilities for integrating people all across the country into the Canadian family.

The challenges include making sure that all Canadians have access to the information highway; that groups at risk (such as women, persons with disabilities and aboriginal people) are not marginalized and that privacy is protected.

The benefits of building a sophisticated information highway infrastructure and educating people in how to use it creatively are many. They include:

- * increased employment and educational opportunities for young people
- * a strengthened educational system
- * more opportunities for training in the workplace
- * support for national unity while maintaining regional diversity
- * more equitable access to learning
- * the development of better-informed citizens
- * better informed-consumers
- * opportunities for marketing Canadian goods and services internationally.

These benefits could help provide a better quality of life for Canadians as we head into a knowledge society. But none of them are guaranteed. They need to be supported and promoted by people who are fluent in the use of computer communications and who understand the social, economic, cultural and political implications of the information highway. The best way to ensure this talented and aware community of online Canadians is to provide online educational opportunities, especially at the beginning of life-long learning. Programs such as SchoolNet are crucial if we are to provide Canadians with the technological and educational opportunities to become creators of knowledge on the information highway, not just consumers. The information highway needs more and better informed Canadians.

Endnotes

1. Joan E. Spero, Under Secretary of State for Economic, Business and Agricultural Affairs, The Challenges of Globalization" at the World Economic Development Congress, Washington, DC, September 26, 1996.

2. Final Report of the Information Advisory Council Preparing Canada for a Digital World

3. Final Report of the Information Advisory Council Preparing Canada for a Digital World

4. The United States is obviously the world leader in the production of Internet content. And it is positioning itself to maintain and expand its market share. It has recognized the importance of education in this positioning by developing programs such as: the Technology Teacher Training program to introduce new teachers to technology (\$75 million); the Technology Innovation Challenge Grant which sponsors partnerships between schools and businesses; the Technology Literacy Challenge Fund (\$25 million directed at educational technology goals); the establishment of Community-based Technology Centres which establish computer learning centres in low-income communities; and The Learning Anywhere Anytime Partnerships program which is geared to improving technology-based learning opportunities for workers, parents and persons with disabilities who are interested in college or workplace training, delivered electronically. The country's major initiative for schools is the E-Rate which is a levy on telecommunication companies to provide \$1.27 billion for schools and libraries to afford advanced telecommunication services. (Source: Technology and Learning June, 1999)

Britain is also sponsoring programs to support electronically-based education. Through its National Grid for Learning program administered by the National Council for Learning it is supplying money for new equipment, teacher training, inexpensive Internet access and partnerships with the private sector. It plans to have all the country's schools, colleges, universities and colleges connected to the Grid by 2002. In 1997 only 6,000 of Britain's 32,000 schools had Internet access. Significant funding for training 500,000 teachers is being supplied by the National Lottery system. (Source: Time Educational Supplement, October 1997)

5. Moore, Gordon. Co-founder of Intel, Quoted in Technology and Learning, June 1999

6. Gilder, George. A U.S. telecommunications analyst. Quoted in Technology and Learning, January 1999, Volume 19 No. 5

7. Statistics Canada, Services Indicator, 1st quarter, 1999. Feature Article: Getting connected or staying unplugged: The growing use of computer communication services.

8. Statistics Canada, Services Indicator, 1st quarter, 1999. Feature Article: Getting connected or staying unplugged: The growing use of computer communication services.

9. Statistics Canada, Services Indicator, 1st quarter, 1999. Feature Article: Getting connected or staying unplugged: The growing use of computer communication services.

10. Statistics Canada, Services Indicator, 1st quarter, 1999. Feature Article: Getting connected or staying unplugged: The growing use of computer communication services.
11. Julia Innes, Database Librarian, TeleEducation New Brunswick, interview
12. Globe And Mail, July 14, 1999, Pg A5
13. Ekos Research Associates Inc. and Lyndsay Green and Associates. The Impact of Technologies on Learning in the Workplace. Final Report. March 1999. Published by the Office of Learning Technologies. The same study reported that in a 1997 survey of human resources development executives many respondents said they were planning to implement learning technologies based on computer communications. The top three technologies were: Intranet (57.3%) multimedia on LAN or WANs (49.9%) and the Internet/World Wide Web (45.8%). Some 40% reported that they had used the Internet for training purposes in the past year. The factors influencing this acceptance include: better and less expensive learning products such as educational computer conferencing systems with built-in administrative and course-creation tools; decreased costs because of digital networks; increased availability of off-the-shelf courses available via the Internet; and an expansion in the level of expertise in the training community around the development, management and delivery of technology-supported training.
14. Statistics Canada, Services Indicator, 1st quarter, 1999. Feature Article: Getting connected or staying unplugged: The growing use of computer communication services.
15. Lavoie, Marie and Richard Roy. Employment in the Knowledge-Based Economy: A Growth Accounting Exercise for Canada. R-98-8E. Human Resources Development Canada (HRDC) Applied Research Branch, Strategic Policy, June 1998 Pg. 16
16. Lavoie, Marie and Richard Roy. Employment in the Knowledge-Based Economy: A Growth Accounting Exercise for Canada. R-98-8E. Human Resources Development Canada (HRDC) Applied Research Branch, Strategic Policy, June 1998 Pg. 16
17. Lavoie, Marie and Richard Roy. Employment in the Knowledge-Based Economy: A Growth Accounting Exercise for Canada. R-98-8E. Human Resources Development Canada (HRDC) Applied Research Branch, Strategic Policy, June 1998 Pg. 16
18. The economy has lost one out of every eight clerical jobs since the beginning of this decade. Source: Gordon Betcherman, Kathryn McMullen and Katie Davidman in Training for the New Economy published by CPRN, Canadian Policy Research Networks, 1998. Pg 11.
19. Statistics Canada, Services Indicator, 1st quarter, 1999. Feature Article: Getting connected or staying unplugged: The growing use of computer communication services.
20. Polarization is reflected in the growing gap between upper and lower income earners in the country. In 1973, the richest 10% of families with children under 18 made 21 times more than the poorest 10% of Canadian families. In 1996 the richest 10% made 314 times more. This has resulted in a shrinking middle class. In 1973, 60% of families with children under 18 earned

between \$24,500 and \$65,000 (in 1996 dollars). By 1996, that percentage had dropped to 44%.
Source: Armine Yalnizyan in The Growing Gap. A report on growing inequality between the rich and poor in Canada. Published by The Centre for Social Justice, , Toronto, 1998. Pg. x

21. Statistics Canada, Services Indicator, 1st quarter, 1999. Feature Article: Getting connected or staying unplugged: The growing use of computer communication services.

22. Ann Cavoukian, Privacy-Enhancing Technologies: Transforming the Debate Over Identity in Digital Democracy, Policy and Politics in the Wired World (Cynthia J. Alexander and Leslie A. Pal eds) Published by Oxford University Press, Toronto, 1998.

23. John Gilbert, Ken Hepburn and Guido Henter. Affordable and Equitable Access to the Information Highway. May 1995.

24. Pathways to New Learning Possibilities: Evidence from Four Projects Involving Learners with Disabilities in New Learning Technologies published by the TeleLearning National Centre of Excellence pp 13-16

25. Norm Lee Gender Equity and Technology. - a paper prepared for the SchoolNet Advisory Board, February 1999

26. Linda Harasim, Network Leader, TeleLearning NCE, Presentation to the 1998 TeleLearning Conference.

27. Assembly of First Nations website (www.afn.ca/eng-main.htm)

28. Assembly of First Nations website (www.afn.ca/eng-main.htm)

29. Assembly of First Nations website (www.afn.ca/eng-main.htm)

30. Source: Gordon Betcherman, Kathryn McMullen and Katie Davidman in Training for the New Economy published by CPRN, Canadian Policy Research Networks, 1998, pg 31

31. Marlene Scardamelia and Carl Bereiter, 1996. Engaging students in a Knowledge Society. Educational Leadership, 54(3), 6-10

32. Gordon Betcherman, Kathryn McLullen, Katie Davidman. Training for the New Economy. Published by CPRN - Canadian Policy Research Networks, 1998. Pg. 42

33. Gordon Betcherman, Kathryn McLullen, Katie Davidman. Training for the New Economy. Published by CPRN - Canadian Policy Research Networks, 1998. Pg. 42

34. Tammy Whalen and David Wright, Cost-Benefit Analysis of Web-Based TeleLearning: Case Study of the Bell Online Institute Pilot Project, a research report published by the TeleLearning NCE, July 1998.

35. Statistics Canada, Services Indicator, 1st quarter, 1999. Feature Article: Getting connected or staying unplugged: The growing use of computer communication services.
36. Edwin R. Black, Digital Democracy or Politics on a Microchip in Digital Democracy. Policy and Politics in the Wired World (Cynthia J. Alexander and Leslie A. Pal eds) Published by Oxford University Press, Toronto, 1998.
37. Charles Sirois and Claude E. Forget. The Medium and the Muse: Culture, Telecommunications and the Information Highway published by IRPP - Institute for Research on Public Policy, 1995. P 50
38. A.W. (Tony) Bates and Jose Gpe. Escamila de los Santos, Crossing Boundaries: Making Global Distance Education a Reality. Journal of Distance Education, 1997, Vol X11, No 1, pp 49-66