A "High-Wired" Balancing Act: Technological Change and Public Education in Canada (1)

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This paper explores the impact of new technologies on public education. It looks specifically at Bill Gates' prediction that new technologies will "alter the focus of education from the institution to the individual." Such a change, the authors suggest, would significantly restrict the "public" element of public education. It would erode society's ability to spread the costs of education among all its citizens. It would further dilute the responsibilities of private interests for training and retraining their employees as they retool to retain and/or increase market share. These changes, it is suggested, further the interests of mobile capital in the globalized economy rather than the needs of students in their classrooms or communities.

Ce travail étudie l'effet des nouvelles technologies sur l'éducation publique. De façon plus précise, il porte sur la prédiction de Bill Gates, selon laquelle les nouvelles technologies vont "modifier le centre de l'éducation, qui va passer des institutions à la personne". L'auteur laisse croire qu'un tel changement limitera de façon sensible la dimension "publique" de l'éducation publique. Il diluera encore davantage les responsabilités des intérêts privés en matière de formation et de perfectionnement de leurs employés, au fur et à mesure qu'ils se réoutillent, dans le but de conserver leur marché et/ou d'augmenter leur part de marché. Ces changements, laisse-t-on entendre, favorisent les intérêts du capital mobile au sein de l'économie globale, plutôt que les besoins des élèves dans leurs classes ou au sein de leurs communautés.

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Propelled by the media, politicians, and promoters of new technologies, the agenda to connect everything in sight to the Internet, including toasters, Coke machines and computer notebook-toting students seems unstoppable. In his book, *The Road Ahead*, Microsoft mogul Bill Gates provides an excellent example of the technological optimism that dominates our culture:

> I've already said I am an optimist, and I am optimistic about the impact of new technology. It will enhance leisure time and enrich culture by expanding the distribution of information. It will help relieve pressures on urban areas by enabling individuals to work from home or remote-site offices. It will relieve pressure on natural resources because increasing numbers of products will be able to take the form of bits rather than of manufactured goods. It will give us more control over our lives and allow experiences and products to be custom tailored to our interests. Citizens of the information society will enjoy new opportunities for productivity, leaming and entertainment. Countries that move boldly and in concert with each other will enjoy economic rewards. Whole new markets will emerge, and a myriad of new opportunities for employment will be created (1995, p. 250).

Tuming to education, Gates offers a rainbow vision of the use of computers in the classroom, jumping from vignette to vignette as to how individual classrooms have used the Internet to invigorate, motivate, excite (presumably) bored students and energize (presumably) tired teachers. There is no research offered to support the inference that computers in classrooms create happier, healthier, and smarter students. Gates surfs over the idea that there are major costs involved in creating techno-centric classrooms, costs that are both financial and social. "Whatever problems direct access to information may cause, the benefits it will bring will more than compensate" (1995, p. 204), he assures us. Pausing to remember that Gates the futurist and Gates the public relations frontman for Microsoft are one and the same, it should be noted that electronic delivery of educational services is a key Microsoft business strategy. The potential benefits to Microsoft are substantial if we confuse the prediction with the propaganda.

Gates' educational vision implies that, "All you have to do is click" to arrive at the educational outcome of your choice; furthermore, it will be just

as easy to "undo" when things begin to go wrong. "Frankly, I'm not too concerned about the world whiling away its hours on the information highway," Gates writes. "At worst, 1 expect, it will be like playing video games or gambling. Support groups will convene to help abusers who want to modify their behaviour" (1995, p. 264). Presumably, these opportunities, too, will be accessed through the Microsoft network.

The easy promises of power brokers like Gates carry much weight in a society seeking instant answers to complex social problems. This paper explores the solutions proposed by Gates and other techno-promoters to the "problem" of schools. It considers Gates' contention that, "The [information] highway will alter the focus of education from the institution to the individual. The ultimate goal will be changed from getting a diploma to enjoying lifelong leaming." Paradoxically, technology is the shift, while at the same time it makes the shift possible (1995, p. 204). What are the resulting costs to the individual and to society? Who will benefit? Or, in the words of technology critic Neil Postman, "What is the problem to which this is the solution? And whose problem is it?" (1997).

The Internet - "Cause Célébre" of the 1990's

The Internet was certainly the centrepiece of technological change at the end of the 20th Century. Developed with public funds in the 1960's as an experimental network to support research and development (Rheingold, 1993), it was rapidly privatized in the 1990's as its commercial value became apparent (McChesney, 1999). Where commercialism was once shunned as contrary to network "ethics," commercial interests are now embraced enthusiastically. The Internet is suddenly the hot advertising medium of the new millennium. Its interactive features seem tailor-made to entice, cajole and manipulate well beyond the boundaries of the traditional advertising spaces, ready to plug directly into the persona1 data stream of a new generation of consumers.

The shift was a well-planned exercise in convergence. The United States Telecommunications Act of 1996 offered a new legal framework and more opportunities for mega-media-merger-mania. Many media watchers foresaw the consequences. Canadian media activist Jesse Hirsh wamed, "The Internet will consume all media until it becomes the information superhighway media monopoly brought to you by AT&T. The Internet is the ultimate red herring, the dazzling distraction that abducts our attention while power plays with totality" (Hirsh, 1996). Gates, however, has sured the public that they have no cause for worry. The deals, he wrote, are

"just background noise; they keep rumbling along whether or not anyone is listening" (1995, p. 248). Gates was certainly rumbling along, aggressively acquiring rights to valuable digital content. "Bill Gates said to himself, 'As long as 1 own the information highway, 1 might as well own the trucks on it, too' " mused Claudio De Polo, president of the Fratelli Alinari Archive, a collection of 15 million historic photos (as quoted in Clark, 1996). Gates' privately owned Corbis Corporation had just bought up the rights to 500,000 digital images, representing a treasure of historic and cultural imagery.

Seeking to add digital school buses to his fleet, Gates keeps his eye on worldwide developments in the electronic delivery of educational services. "It's very exciting to see what's going on here in Canada in a number of areas... SchoolNet... is the leading program in the world in terms of letting kids get out and use computers," observed Gates (as quoted in Industry Canada, 1996, p.23) while in Ottawa on his Windows '95 tour. His comments on SchoolNet, the Industry Canada on-line service for schools, were featured in the Liberal "Red Book," a policy strategy document produced by the Liberal party whenever an election is underway. Such a prominent supporter makes excellent political collateral.Provinces are following closely behind. New Brunswick formed a partnership with Microsoft Canada to set up an interactive "virtual campus" using Microsoft On-line Institute (MOLI), an "interactive leaming and information resource" accessible on the Internet through the Microsoft Network. "It virtually tums a computer into a world-class campus" boasted a press release from the New Brunswick Department of Economie Development and Tourism ("New Brunswick company offers courses," 1997). On this virtual campus, everyone from kindergarten pupils to corporate employees can take courses from anywhere, at any time, 24 hours per day. Microsoft's technical experts have been contracted to train New Brunswick content providers on the use of Microsoft software. Microsoft will charge the province for running the network; students will be charged a fee for courses they take.

Former New Brunswick Premier Frank McKenna hoped this would enable the province to develop courses for export to countries around the world, with New Brunswick seizing the opportunity to become a "world-class" educational cal1 centre. Whether McKenna's dream materializes or not, clearly Gates has managed to export his dream to both politicians and marketers. It is easy to imagine an educational future centring around the customized delivery of homogenized services. "McSoft" education could do it all for the new generation of plugged-in leamers.

Assisted by politicians and promoted by powerful information technology industries, the future of education has become inextricably bound to the Internet, this "dazzling distraction." It has assumed a central role in education reform agendas around the world. Between 1994 and 1996, Japan declared its intention to install 900,000 network-equipped PCs in schools by the year 2000; Germany announced a three-year "Schools on the Network" project; Denmark vowed to put all schools on-line by the year 2000; Finland established an "Education, training and research in the information society" strategy; and the UK initiated a "Superhighway in education" plan ("Europe Union," 1996). The demands of globalization - deregulation to enable free trade - help explain this unprecedented convergence in educational planning. Canadian govemments have either bought in or caved in, depending on who is describing the appetites of globalization. "The role of govemment is to reduce the impediments that reduce competitiveness and thus add value," trade minister Sergio Marchi told an education marketing conference (Robertson, 1998, pp. 12-13). The origins of the current deregulation mania in the communications industry should not be lost to Canadians. In his 1989 analysis of the effects of corporate growth on American public policy, U.S. communications expert Herbert Schiller noted that "in tracing the main lines and identifying the key players in the deregulation of American communications, one point needs special emphasis. What began as a [U.S.] domestic restructuring for interna1 economic reasons has had global impact" (Schiller, 1989, p. 113).

Towards Deregulation

In January 1994, U.S. vice-president Al Gore issued a "challenge" to industry leaders to connect all American schools, hospitals and libraries to the information highway by the year 2000. Yet this speech was not about schools, hospitals or libraries. It was about competition between the telephone and cable industries and about the Clinton administration's intention to "clear from the road the wreckage of outdated regulations and allow a free-flowing traffic of ideas and commerce for the benefit of all Americans" (White House, 1994). Bill Gates couldn't have said it better. American-based communications and information industries dreamed of an ever-widening dissemination of their products through an information highway as ubiquitous as the television set, but now ready to take orders for everything from blue chip stocks to running shoes. The strategically-placed challenge satisfied the political requirement for the appearance of public benefit, but the objective was clearly the deregulation of the communications industry to strengthen the position of U.S.-based interests in glo-

balized markets, not the improvement of education.

At the same time, Industry Canada's Science Promotion Directorate launched its SchoolNet program to provide Canadian students and teachers with "exciting electronic services that would develop and stimulate the skills needed in the knowledge society" (Industry Canada, 1996, p. 22). Since very few schools had even heard of such electronic services at that time, let alone tried to connect to them, the first task for SchoolNet was to promote electronic connections in Canadian elementary and secondary schools. As it did in the U.S., the education initiative helped to divert Canadians from the critical examination of public interest issues. There was little debate about the possible loss of sovereignty imbedded in the deregulation demands of the communications industry, and little concern that Canadians might forfeit any ability to manage their communications environment - the key strategic resource of the 21st century. (2)

Government public relations machines went into overdrive pushing the impending communications revolution into the classroom. The rhetoric mixed the carrot with the stick. "The contest for markets in the 21st Century is being fought right now in the classrooms of the world!" said Industry Minister John Manley promoting the need to have more technology in the classroom (as quoted in ITAC, 1994). The federal Information Highway Advisory Council (IHAC), a blue ribbon policy advisory pane1 appointed by Industry Canada, claimed that using the new technologies in the classroom would result in an immediate reduction in the high school drop-out rate and subsequent savings in the order of $26 billion by the year 2000 (IHAC, 1995). No supporting information was offered to back up this astonishing statement. A recommendation from Phase II of the IHAC process strongly endorsed full Internet access for all schools and identified the private sector as a key player in realizing that goal (IHAC, 1997, p. 52). Should the private sector be relied upon to provide fundamental resources for a supposedly publicly funded institution? Such discussions would have to find other fora. This parade was carefully shrink-wrapped and rain-proofed well before being placed on public review.

Globalization causes (or creates an excuse for) "disintermediation," a post-modern coinage that means political power gravitates rapidly to either global or local entities. Intermediate levels of government, bureaucraties, and corporations scramble to redefine themselves or face forced restructur-

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ing. Nation-states themselves become "intermediate" governments, as their traditional powers are subsumed by organizations at the super-govemment level or encoded in trade agreements. The federal govemment may be seeking to "re-mission" itself by carving out a national role in education, whether the provinces object or not.

Provincial govemments are caught in a different part of the globalization vice. Traditional sources of tax revenues slip away as mobile capital roams the world looking for the cheapest labour markets. The need to control "out of control" spending justifies massive centralization efforts. As Michael Apple points out, technology makes "the middle" both untenable and redundant because it offers "new forms of control, [it enables] the process of deskilling, the separation of conception from execution, [processes which] are not limited to factories and offices" (1995, p.127). It may be no coincidence that New Brunswick, determined to become both the cal1 centre capital of North America and a leader in the electronic delivery of education, was also the first province in Canada to abolish school boards altogether.

The Road to Education Reform

Education shifts when power shifts. Howard Besser identifies several predictable stages when educational services are redefined to meet the needs of new power structures. First reports are produced by expert panels, usually by a blue ribbon team of business leaders, in which ski11 deficiencies are articulated and international comparisons are seized upon, often presented in misleading ways. The media obliges by indulging in a feeding frenzy of "schools are failing" stories (Besser, 1993, pp. 50-61). This is a well-wom (and well-documented) path followed both in Canada and in the United States. Among the consequences of what David Berliner and Bruce Biddle cal1 "the manufactured crisis" is a decrease in the power of public education as measured by public and political support (Berliner, 1995).

The high-tech corporate sector which stands to gain the power schools lose, has been among the most active critics of the quality of public education and the validity of education's goals. (3) Their solutions to the "problem" of schools are both technocratic and technology-rich. Central fiats, central control, and central reform are key strategies that fit seamlessly into globalization. In all provinces, such initiatives are underway. New Brunswick abolished school boards, placing educational decision-making

(3) See "Visioning education in the information economy" by Alison Taylor for a description of Canadian corporate alliances impacting on education and "Canadian classrooms on the information highway: Making the connections" by Marita Mol1 for a specific discussion of high tech alliances in the connecting classrooms agenda. Both essays appear in Moll, Marita (ed.). Tech High: Globalization and the Future of Canadian Education. Ottawa: Canadian Centre for Policy Alternatives, 1997.

directly in the hands of government officials. Alberta reduced the number of rural school boards from 144 to 60, the number of trustees from 1500 to 500, and county governance of education was abolished. Ontario reduced the number of school boards from 129 to 66 and the number of trustees from 1,900 to 700. The Ministers of Education from Manitoba, Saskatchewan, Alberta, British Columbia, Yukon Territories and the Northwest Territories entered into an agreement to collaborate in designing a Western protocol for mathematics, science and language arts curricula. The Council of Ministers of Education (CMEC) initiated a project to harmonize program protocols across the country - beginning with a Pan-Canadian science education protocol. All of these initiatives support and are supported by the new technologies being proposed for the classroom. Eventually, centrally developed curricula could be pushed out to any desktop in the country on a just-in-time, pay-as-you-go basis. This might sound far-fetched from a policy perspective, but the technology will soon be in place to make it possible. And the technological imperative, "because it can be done, it should be done," is a well-worn path in North American culture.

The second step on the way to reform is induced educational deterioration. Canadians may criticize their schools, but at the same time they hold them, and the traditions they embody, in general respect. To gain enough political support for the public to accept substantial change in schools is difficult as long as the public remains satisfied with schools as they are. To move from the "schools are failing" rhetoric to the felt reality of systemic crisis, the system must be starved to the point where it can no longer deliver on its stated goals and objectives.

Such a process has been underway for several years. Educational funding cuts in Canada in 1996-97 removed a further $928 million or 2.9 percent from a system already squeezed at all levels (Canadian Teachers' Federation, 1996 A, p. 1). The Ontario government sought to save $150 million with its recent reorganization proposals. According to the British Columbia Teachers' Federation, per student spending on elementary/secondary education in B.C. declined by $427 or 7 per cent between 1990/91 and 1996/97, while enrolment increased by 16 per cent, the number of special needs students increased by 60 per cent, and ESL students increased by 128 per cent (McLintock, 1997, p. A4). In its analysis of staffing and class size issues, the British Columbia Teachers' Federation found that the student/educator ratio had increased in the 1990's, while teacher librarian services had declined, despite the role teacher librarians play in teaching students to use information technology. Between 1993 and 1997, Alberta cut $224 million from the education budget and spending decreased by $466 per student, according to Alberta Education's 1995/96 Annual Report

(as cited in "Election '97," 1997, p. 1). At the same time, the "Alberta Teachers' Association *Report on Education in Alberta, 1996,* indicates that 63.5 percent of teachers have fewer resources to help children than they did three years ago. Teachers in Alberta schools are finding it harder to obtain the resources they need to help children. Guidance counsellors, reading specialists, teacher-librarians and teachers' assistants have become endangered species. Fully 78 percent of teachers report a decrease in assistance for students with special needs" ("Election '97," 1997, p. 1).

The Atlantic Provinces Education Foundation (APEF) noted that student/teacher ratios and class size had increased for almost all Atlantic provinces since 1989/90 (APEF, 1996). School boards were finding it increasingly difficult to maintain high levels of services. Cutbacks in government funding had placed schools, particularly the poorest schools and school boards, in an extremely vulnerable position.

Amidst all this, the physical infrastructure was also deteriorating. *Canadian Schoolhouse in the Red,* a 1993 national study of Canadian school facilities reported that two out of three school buildings had exceeded their predicted useful life. Fifty-three per cent of these were built in the 1950's and early 60's fourteen percent were built before 1950, and certainly not with the needs of the "Information Age" in mind.

It is hardly surprising that a national poll conducted for the Canadian Teachers' Federation in April 1998 found that Canadians identified underfunding as the greatest problem faced by schools (Vector, 1998). This did not deter them from expecting more from their schools, however. As a result, demoralized teachers, driven in contradictory directions by centrally mandated policies, know that the gap between what is expected of them and what is possible is widening every day. In this climate of shrinking resources and growing expectations, the addition of the current technological imperative has become "one more way not to be good enough" writes Alberta teacher and educational researcher Jean Claude Couture (1998, p. 150). The power known as orofessional self-esteem gradually ebbs away.

Following the Money

Despite alleged financial "crises," every province has made a considerable amount of money available for new technology. Globe and Mail reporter Andrew Tausz reported that "Alberta [despite massive funding cuts]... will invest $45-million in classroom technology. Ontario doubled its funding to $40-million for a program that matches private-sector invest-

(4) For more information on provincial technology plans see: Council of Ministers of Education Canada. (1996, July). The Use and Teaching of Information Technologies at the Elementarv and Secondary Levels. Summarv of Questionnaire Responses. and "Technology plans — An update on recent initiatives," CEA Newsletter, (Canadian Education Association), March 1997.

ments in public school technology. New Brunswick recently completed a three-year, $23-million initiative to link every public school in the province to the Internet" (Tausz, 1996, p. C6).(4) These figures are only suggestive. There is no record of how much has already been spent on technology, nor have there been any studies to determine the impact of these technology expenditures on students, teachers, or the already strained resources of schools. There has been minimal teacher education, or curriculum preparation for the massive changes envisioned by government and industry. The CMEC has suggested that the idea of lending laptops to teachers to work on during weekends is a promising "professional development" strategy (CMEC, 1997).

Between 1994 and 1997, through Industry Canada and its SchoolNet program, the Federal government spent between $25-35 million to develop services that promote and support the use of technology in education. The February 1998 federal budget allocated $205 million over three years to expand and extend SchoolNet and its companion Community Access Program (CAP) (Finance Canada, 1998). In June 1998, Prime Minister Jean Chrétien announced his government's intention "to have a computer for every Canadian class in every school by the end of the year 2000, a target that will require 250,000 computers to be donated by governments and the private sector (Chrétien, 1998).

The $13 million invested in the Telelearning Research Network which connects 125 researchers in 28 universities has attracted corporations such as Apple, IBM and Microsoft who pay $20,000 each for the privilege of being close to the starting gate when these publicly-funded experiments move into the product development and marketing stages. Some of the $78.5 million of public funds granted to Phase II (1995-1999) of the industry-led and managed CANARIE Inc. (Canadian Network for the Advancement of Research, Industry and Education) has also been targeted to educational products. A CANARIE newsletter announced that a newly formed Education Steering Committee would be working "as a catalyst and facilitator to bring together various government representatives and institutional stakeholders to develop a pan-Canadian strategy for integrating technology into the educational system" (Harasim, 1997, p. 7). The Committee, chaired by Telelearning leader Linda Harasim, is also working on a private sector- led initiative called Oui.Can.Leam. Such convergence of thinking between a leading spokesperson in the Canadian educational academic community, the govemment of Canada and the interests of the information technology industry, so well articulated by Bill Gates, is truly a sign that times are indeed "a-changing," as Bob Dylan wamed in the '60's.

The public appears to have some other education spending priorities.

Surveys show that computers rank well behind teacher upgrading and smaller class sizes (Canadian Teachers' Federation, 1996, p. 6), when Canadians are asked where money for education should be spent. A referendum in a North Vancouver school district which sought a small property tax hike to fund the updating of computer hardware and software was defeated by a 58 percent majority (Schaefer, 1997, p. A6). At its 1996 Annual Meeting, the Canadian Home and School and Parent-Teacher Federation passed an emergency resolution urging all education stakeholders to support the continued role of music and fine arts education as a fundamental part of public schooling, programs which have suffered particularly heavy cuts in the recent budget squeeze. A January 1997 Angus Reid poll showed that two-thirds of Albertans thought the public education system was working well but was under-funded. Forty-four per cent of those polled feared that recent changes to education could lead to a two-tiered system ("Majority of Albertans," 1997, p. 1).

All this means that the current agenda for education reform is quite evidently not driven by a populist agenda, and it is not driven by educators. The powering up of schools is not driven by a need to spend excess money. This leaves two options: it is occurring because it serves students' interests or because it serves a political/economic agenda despite students' interests.

Where's the Benefit?

Ask most teachers and parents why schools have been told to "embrace technology," and they will respond with either or both of these rationales: using computers improves student achievement and/or using computers is the route to (or synonymous with) computer literacy, which will prepare students for the workforce of the future. Both these statements are closer to urban myths than fact. Their passage into conventional wisdom, despite much evidence to the contrary, serves the mythmakers very nicely.

Defying the myths, many researchers and media critics continue to point to the scant evidence that the new technologies will deliver the "more effective, more efficient" education promised. Numerous analysts and researchers point to the absence of independent research indicating a strong cor-relation between the use of technological tools and the improvement of learning (Moll, 1998; Robertson, 1998). Larry Cuban concluded that "the research evidence on [the overall effect of technology on student learning] was ambiguous and unhelpful in determining policy" (1990, p. 205). Stephen Kerr, "one of the few [educational] researchers who examines seriously the deep-set beliefs of both technophiles and technophobes" (Cuban, 1990, p. 209), pointed out that there was no proof that using

technology in the classroom increased achievement (Kerr, 1991, p. 114). U.S. researcher Thomas Becker reviewed evaluative studies on the integrated learning systems in which many schools had invested heavily and found that the research had been of poor quality and moderate effects had been typically overstated (Becket-, 1992). "No long-ter-m supporting empirical or qualitative evidence shows that technology has made schools and teachers more effective or significantly positively affected the lives of their students," write Muffoletto and Knupfer (1993, p. 2). In 1999, educational researcher Thomas L. Russell compiled a database of findings related to the effective use of technology, chiefly in the field of distance learning, as compared to alternative methods or techniques of teaching. Three hundred and fifty-five research reports, summaries, and papers are cited in which no significance difference was reported between the variables compared. (Russell, 1999). ". . . these no significant difference studies provide substantial evidence that technology does not denigrate instruction," says Russell. (1999, p.xiii).

Finally, Thomas Fleming, professor of educational history at the University of Victoria and teacher researcher Helen Raptis, after an extensive analysis of research in educational technology, concluded that "what is actually known about the effects of educationai technology on the cognitive development of students appears remarkably small. Because SO few publications in this area of research have explored cognitive effects in empirical ways, there is almost no scientific basis for discussion, beyond the findings of a handful of papers. In fact, apart from their panacea effects as 'gateways to new worlds of learning,' or marginal claims about improving student learning, no strong or coherent argument for educational technology's use in schooling may be found in the literature of recent years (Fleming, 2000)."

The incompatibility of the more effective/more efficient rationales is pointed out in the research done by well-known American researcher Henry Becker. Becker concludes that exemplary classrooms using computers reduced class sizes to 20 and incurred additional costs amounting to about $1,000 per pupil per year in extra personnel and support costs. Hardware and maintenance costs were about $500 per pupil per year (Becker, 1994). Accounting for the exchange rate, Canadians are looking at more then $2,000 per pupil per year. Fleming and Raptis note "it is interesting to observe that the high acquisition costs of new technologies — and the remarkably short periods they remain state-of-the-art — is not justified within the literature on the basis that they may yield significant labour-cost

For more information outlining potential costs see: Froese-Germain, Bernie. (1998). "Taking another look at education and technology (Part 4): The 'computers in schools' express - all aboard?" Ottawa, ON: Canadian Teachers' Federation. Available at: http://www.ctf-fce.ca/e/what/restech/ART&PAP2.htm

savings, by making instruction more efficient, or by reducing the time it takes for students to complete programs of study (2000)." So far it seems quite clear that the benefits are, as yet, quite undetermined, but the information technology industry knows the true costs better than anyone. A recent advertisement for Compaq Computers claims that 85 percent of the money spent on technology is spent post-purchase. Computer "intensification" can never be a cost saving proposition unless education ceases to be conceived of and delivered in traditional ways.

The Cult of Individualisation

The ideology of individualism moves in tandem with the culture of progress through technological innovation. Note the growth of the "personal" computer, "persona1 productivity software," and entertainment technology that allows persona1 viewing, listening and singing along. Now technology can be used to shift the emphasis from the collective experience and benefit characteristic of schools to individual experiences and benefits. There are many who, for various reasons, concur with Gates' suggestion that education must be more tailored to the needs of the individual (1995, p. 204). "The central organizing principle we need for education in our future is mass customization: a unique education curriculum, a unique set of educational tools, and perhaps even a unique set of educators for each and every student," says futurist Richard Worzel(1996, p. 5). "Computers will permit a degree of individualization - personalized coaching or tutoring - which in the past was available only to the rich. Al1 students may receive a curriculum tailored to their needs, leaming style, pace and profile of master-y . . ." predicts Howard Gardner, well known for his work on multiple intelligences (2000). In a less altruistic vein, Trimark Investment Management Inc. wams that, "In the year 2014, they say it will cost over $65,000 for an undergraduate degree (1996)." The advertisement urges Globe and Mail readers to start their persona1 "Legacy for Leaming" fund right away. After all, if leaming is "personal," why would costs not be "personalized"? Unfortunately, the emphasis on the "individual" and "personal" appears to be eroding our commitment to the social and collective responsibilities for education. Recent examples of this in public policy at the federal level have been (personal) Millennium scholarships and (personal) RESP's as a response to the under-funding of post-secondary education.

Who will have the most choice and the most benefit in this new educational supermarket? Those with the greatest (personal) resources, of course. The information highway will indeed provide new services for those who

can afford them, but on-line education in which students can take any course, at any time, from any location, could be much more restrictive for the majority of citizens than the current education delivery mechanisms. As traditional ways of delivering education begin to disappear or become too expensive, a "plug and play," "pay as you go" modular education system could replace the current system in which society shares the costs and the benefits, in which individual and collective interests are balanced through democratically elected decision-makers. In the year 2014, technology pushes education to "you":

> What is it you want to learn from Microsoft software?
> What is it you want your children to learn?
> Here it is, right at your fingertips. All you have to do is click (Microsoft, 1997).

Offloading responsibility for education from society to the individual appears to be part of the plan for education in the new millennium. In this brave new world, those seeking enhanced educational services will find many options available to them, at a price. Those who cannot afford this price will become the new underclass in the jungle of the information age. "All you have to do is pay" is a more honest conclusion to the Microsoft mantra.

Buyer, beware!

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References

Atlantic Provinces Education Foundation (APEF). (1996). *Education Zndicatorsfor Atlantic Canada.* Halifax, Nova Scotia: Author.

Apple, Michael W. (1995). *Education and Power.* (2nd ed.). New York: Routledge.

Becker, Henry Jay. (1992). Computer-based integrated learning systems in the elementary and middle grades: a critical review and synthesis of evaluation reports. *Journal of Educational Computing Research,* 8. pp. 1-41.

Becker, Henry Jay. (1994). How exemplary computer-using teachers differ from other teachers: implications for realizing the potential of computers in schools. *Journal of Research on Computing in Education,* 26 (3). pp. 291-321.

Berliner, David, and Bruce Biddle. (1995). *The Manufactured Crisis.* Don Mills, ON: Addison-Wesley Publishers Ltd.

Besser, Howard. (1993). Education as marketplace. pp. 50-61 in Muffoletto, Robert and Nancy Nelson Knupfer (Eds.), *Computers in Education; Social, Political & Historical Perspectives.* Cresskill, New Jersey: Hampton Press, Inc.

Canadian Teachers' Federation. (1996, October). *Economic Service Notes,* 9. p. 1.

Canadian Teachers' Federation. (1996). Major findings of 1996 Vector Opinion Pol1 on CTF national education issues. *Economic Service Bulletin, 6.*

Clark, Jennifer. (1996, March 8). Bill Gates goes cyberspace truckin'; his Corbis Corp. carving out position in digital-photo market. *Montreal Gazette.*

Council of Ministers of Education (CMEC). (1997). Developments in Information Technologies in Education. Document prepared for the 13th Conference of the Commonwealth Education Ministers, July 28 August 1, 1997. Botswana.

Couture, Jean Claude. (1998). Teachers work: living in the culture of insufficiency. pp. 139-165 in Moll, Marita (Ed.), *Tech High: zation and the Future of Canadian Education.* Ottawa, ON: Canadian Centre for Policy Alternatives

Chretien, John. (1998, June). Speech delivered at the meeting of the Federation of Canadian Municipalities. Regina, Sask.: Available at: http://pm.gc.ca/cgi-win/pmo_view.exe/ENGLISH?798+0+NORMAL.

Cuban, Larry. (1990). Computers meet classroom: classroom wins. *Teachers College Record, 9.5* (2). pp. 8 15-210

Election '97: What are the issues facing Alberta schools and teachers? (1997, February *25). The ATA News,* 31 (13). p. 1.

Europe union joins world-wide cyberschool drive. [editorial]. (1996, November 8). *Information Society Trends, 59.*

Finance Canada. (1998). *Budget 1998. Building Canada for the 21 st Century; Canadian Opportunities Strategy.* Available: http://www.fin.rrc.ca/budget98/cose/cos4e.html.

Gardner, Howard. (2000). Technology remakes the schools. *The Futurist.* Mar/Apr. pp. 30-32.

Gates, Bill. (1995). *The Road Ahead* with Nathan Myhrvold and Peter Rinearson. New York: Penguin Group.

Harasim, Linda. (1997, January). Canarie Learning and Training Workshop. *Communique.* p. 7.

Hirsh, Jesse. (1996, November 17). The mythology of technology: The Internet as Utopia. Available from: jesse@tao.ca (Jesse Hirsh)

Industry Canada. (1996). *Building the Information Society: Moving Canada into the 21st Century.* Ottawa, ON: Industry Canada.

Information Highway Advisory Council (IHAC). (1995). *Connection, Community, Content: The Challenge of the Information Highway.* Final Report. Ottawa, ON: Minister of Supply and Services.

Information Highway Advisory Council (IHAC). (1997). *Preparing Canada for the Digital World.* Final Report. Ottawa, Ontario: Minister of Supply and Services.

Information Technology Association of Canada (ITAC). (1994). *Education Statement.* Mississauga, ON: ITAC.

Fleming, Thomas and Helen Raptis. (June 2000). Educational technology: A topographical analysis of research, 1990-1999. *Teacher Librarian* v.27, #5. Available at: http://www.teacherlibrarian.com/fleming-raptis.html

Kerr, Stephen T. (1991). Lever and fulcrum: educational technology in teachers' thought and practice. *Teachers College Record, 93* (1). pp. 114-136.

Majority of Albertans say education is underfunded. (1997, February 25). *The ATA News,* 31 (13). p. 1.

McChesney, Robert W. (1999). *Rich Media, Poor Democracy; Communication Politics in Dubious Times.* Chicago: University of Illinois Press.

McLintock, Barbara and Ian Austin. (1997, April 11). Students worse off by $247 a year: Teachers and Education Minister Ramsey doesn't dispute BCTF figures. *Vancouver Province.* p. A4.

Microsoft Corporation Advertisement. (1997).

Moll, Marita and Bernie Froese-Germain. (1998). Taking another look at educational technology (Part 3) Bridging the Gap Between Research and Rhetoric. Ottawa: Canadian Teachers' Federation. Available at: http://www.ctf-fce.ca/e/what/restech/ART&PAP2.htm

Muffoletto, Robert, and Nancy Nelson Knupfer. (1993). *Computers in Education: Social, Political & Historical Perspectives.* Cresskill, NJ: Hampton Press, Inc.

New Brunswick company offers courses world-wide with Microsoft. Press Release, (1996, February 23). Fredericton, New Brunswick: Department of Economic Development and Tourism. Available: http://www.nov.nb.ca/cnb/news/edt/6e0209et.htm.

Postman, Neil. (1997, March 21-22). Rethinking McLuhan. Unpublished remarks at a symposium at York University.

Rheingold, Howard. (1993). *The Virtual Community: Homesteading on the Electronic Frontier.* Don Mills, Ontario: Addison Wesley.

Robertson, Heather-jane. (1998). *No More Teachers, No More Books: The Commercialization of Canada's Schools.* Toronto: McClelland & Stewart Inc.

Russell, Thomas L. (1999). *The No Significant Difference Phenomenon.* Raleigh, N.C.: North Carolina State University.

Schaefer, Glen. (1997, April 21). Techno tax nixed in N. Van. *Vancouver Province.* p. A6.

Schiller, Herbert I. (1989). *Culture, Inc.; The Corporate Take-over of Public Expression.* New York: Oxford University Press.

Tausz, Andrew. (1996, October 15). How tech firms court the key education market. *Globe and Mail.* p. C6.

Trimark. (1996, November 14). Guide to education. [Supplement]. Globe *and Mail.*

Vector Research + Development Inc. (1998, September). The Canadian Teachers' Federation National Issues in Education Poll. CTF *Economic Service Bulletin, 5.*

White House. Office of the Vice-President. (1994, January 11). *Remarks by Vice-President AZ* Gore, Royce Hall, UCLA, Los Angeles, California. Washington, D.C.

Worzel, Richard. (1996, May/June) Comes the revolution. *Teach.*

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