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**Technology Integration in Alberta Schools - A Review of Policy and Practice:
Reliance on Technology Undermines Support for Teachers**

by

Catherine Thurm, B.A.

**A thesis submitted to
The Faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of**

Master of Arts

School of Journalism and Communication

**Carleton University
Ottawa, Ontario
September, 1999**

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Reliance on Technology Undermines Support for Teachers**

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Abstract

Focusing on machines and ignoring the people who make them work characterizes technology implementation in Alberta Schools. This thesis reviews the plans of official government policy and contrasts these plans with the experience of teachers in the classroom.

Schools are striving to provide computer labs, hardware, software and Internet connections. Justification for technology spending is based on glowing reports of efficiency and effectiveness included in the policy discourse. The promise of technology tends to overshadow the manifold support mechanisms needed by teachers to implement the technology successfully. Teachers are expected to integrate media awareness, information management and technical skills into their regular curriculum. Preparation and execution of these technology -related skills means that teachers are tasked with the work of three additional subject areas. Teachers also must deal with ongoing technical challenges such as faulty or dated equipment and, more and more, find themselves having to fix a variety of time-consuming problems in the technical system. In contrast, teaching staff has been reduced and professional support staff, such as the teacher-librarian, has been nearly eliminated.

An evaluation of these teaching needs demonstrates the shortsightedness of the Alberta government's technocentric reforms. Attention to teacher's needs and technical needs must be considered simultaneously.

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Introduction

The dishwasher was an exciting new invention that was to revolutionize work in the kitchen. It carried with it the promise of improved efficiency. In the home it signified the opportunity for greater leisure time by promising less work in kitchen cleaning.

Unfortunately, crystal does not fair well in the dishwasher and still requires the primitive method of hand washing. Pots also pose a problem when there is caked-on-food. At the very least, the pots should be pre-rinsed, and by that time why bother putting them in the dishwasher? This is not to say that the dishwasher does not have its benefits but the promise was much more than what was realized. When we consider pre-rinsing, loading and unloading, it is difficult to judge whether or not we are actually doing less work or if we are just doing the work in a different way.

This dishwasher example is analogous to the story I am about to tell. The gadget serves a different purpose and the setting is in a school rather than in the kitchen but the story reflects the same ideas of progress riding on the coat tails of a new technology.

New Gadgets in Education

The innovations of local area networks, desktop computers, the Internet, high speed connection capabilities (ISDN lines) and a limitless expanse of software all contribute to a popular computerization movement. Suzanne Iacono and Rob Kling discuss the expansive nature of the movement suggesting that everyone from the “government, media, grass-roots organizations and coalitions of organizations” see new communication

technologies as an “important symbol of progress and accessibility.”¹ This computerization movement has also won increasing support within education sectors.

‘Empowerment’, ‘efficiency’, and ‘rejuvenation’ are common terms used to describe the implementation of information technologies in schools. According to the rhetoric, students and teachers will have access to vast amounts of new information. New technologies hold out the promise of breaking traditional education barriers. Outdated textbooks, limited library resources, and confined creativity can be improved with the power of converging communication technologies. David Livingstone suggests that technological hyperbole or hype is part of a typical cycle of educational change. According to Livingstone, the early phase of change is marked by “...prediction[s] of extraordinary changes in teaching and learning practices by zealous advocates.”² This early enthusiasm is often short lived, warns Laurie Walker, Dean of Education at the University of Lethbridge. “The history of technological innovation in education suggests what has been called the roar, stumble and fade pattern” states Walker.³ Despite the historic pattern, the potential of a transformed social order is firmly rooted in the hype of technology, and the optimism helps “legitimate relatively high levels of computing investment for many potential adopters” (Iacono & Kling, 1995, p.2).

¹ Iacono, S. & Kling R. “Computerization Movements and Tales of Technological Utopianism” *Computerization and Controversy: Value Conflicts and Social Choices*. 2nd Edition: Rob Kling (Ed.), Academic Press. 1995. URL: gopher.ed.gov:10001/00/initiatives/technology/testimon Hereafter referred to in the text as Iacono & Kling.

² Livingstone, D. “Computer Literacy, the “Knowledge Economy” and Information Control: Micro Myths and Macro Choices” *TechHigh Globalization and the Future of Canadian Education*, Ed. Marita Moll, Co-published by The Canadian Centre for Policy Alternatives, Ottawa and Nova Scotia: Fernwood Publishing, 1997, 102.

Iacono and Kling identify "1993 [as] a watershed year for the promotion of communications networks and computer technologies in the United States" (1995, p. 1). The U.S. government established the National Information Infrastructure (NII), a computer network designed to carry an abundance of information with a promise of universal access. The move towards the classroom received a significant boost on January 11, 1994, when U.S. Vice President Al Gore challenged the nation to "connect every classroom by the year 2000" to the National Information Infrastructure (Iacono & Kling, 1995, p.2).

A similar pattern was unfolding in Canada. In 1993, political enthusiasm was evident at the federal level through the SchoolNet National Advisory Board. SchoolNet was mandated to provide educational materials via electronic services. Marita Moll, at the Canadian Teachers Federation, argues that "[s]ince very few schools had ever heard of such services in late 1993, let alone tried to connect to them, the first item of business for the SchoolNet team was to promote connections to electronic services in Canadian elementary and secondary schools.⁴ By 1997 almost every provincial government had made a financial commitment to connecting its schools.

This paper focuses on Alberta's commitment to technology in education. Alberta offers an interesting Canadian case study. It was one of the first provinces to adopt new

³ Walker, L. "Accelerating on the Information Highway" *The ATA Magazine*, Vol. 76, No. 3, Spring 1996, 20.

⁴ Moll, M. "Canadian Classrooms on the Information Highway: Making the Connections" *TechHigh Globalization and the Future of Canadian Education*, Ed. Marita Moll, Co-published by The Canadian Centre for Policy Alternatives, Ottawa and Nova Scotia: Fernwood Publishing, 1997, 34.

converging computer and telecommunications technology as a province wide education solution and has demonstrated an unabashed enthusiasm for technical fixes.

Technology Integration in Alberta: An Overview

Alberta's Minister of Education initiated a process of review, analysis and public consultation on policy issues regarding technology in education in 1994. The subsequent years have been devoted to implementing computer networks and the Internet throughout Alberta's education system. The provincial ministry hosted public consultations and a provincial feedback survey to determine general attitudes about the use of computers and the Internet in Alberta's classroom. Early in 1996, the Minister of Education released the *Framework for Technological Integration in Education* and by the end of that year demonstrated its commitment to technology in the *Implementation Plan for Technology in Education*. At the same time the School Technology Task Group was established to direct the implementation initiatives.

New curriculum guidelines were established in November 1997 as an accountability measure. The *Learner Outcomes in Information and Communication Technology, ECS to Grade 12* document provides standards for evaluating information, communication and critical thinking skills that are expected to result through computer use. In March 1998, a draft of the *Technology Outcomes with Illustrative Examples and Suggested Curriculum Links* was distributed to the schools. In June of 1998 the project became an Interim Program of Study and by June 2000 it will be implemented as a Technology Program of

Studies.⁵ The curriculum outcomes are designed to ensure that all schools meet base requirements in regards to teaching technology skills. It is stipulated that technology skills be taught within the context of existing subjects such as social studies, math, and language arts. This is referred to as “curriculum within a curriculum:”

Because technology outcomes are interrelated with subject specific outcomes, they are integrated into a variety of existing programs. Each of the outcomes needs a context to be meaningful. The development of word processing skills, for example, may be addressed within the context of communication.⁶

Six years into the implementation process, in February 1999, a best practices document has been released entitled *Preparing to Implement Learner Outcomes in Technology*. The report provides information for teachers on how to manage new technology curriculum in their classroom. It also represents one of the first initiatives to focus new technology-related teaching demands. Acknowledged within the report “resources to support this implementation process have not been extensive to date, help is on the way – in this report and in a variety of other publications...” (Learner Outcomes in Technology, 1999, 1).

Financial support has changed over time but in accordance with the policy rhetoric, hardware, instructional software, training and networking components have been the main funding recipients (STTG, p. 2). Funding for new computer and computer

⁵ School Technology Task Group, Alberta Education Website, Alberta, 2.
<http://ednet.edc.gov.ab.ca/technology/> Hereafter referred to in the text as STTG.

⁶ *Preparing to Implement Learner outcomes in Technology: Best Practices for Alberta School Jurisdictions*, Alberta Education, Alberta, February 1999. See also the Alberta Education Website: <http://ednet.edc.gov.ab.ca/technology/> Hereafter referred to in the text as Learner Outcomes in Technology, 1999.

networking technology began in 1996 and has been extended to the year 2001.

According to background documentation from the School Technology Task Group, the “[g]overnment re-investment has provided \$85 million in Technology Integration Funding to provide technology upgrading for students from 1996/1997 to 2000/2001” (STTG, p. 2).

The Problem

The technological trajectory that is established through the policy process as well as the teachers’ values and experiences with technology are the main focus of this study.⁷ In evaluating Alberta’s technology initiatives, both in policy and practice, two conflicting narratives come to the forefront. The first narrative generated through the policy framework focuses on machine-generated efficiencies and opportunity. The second narrative comes from within the schools. It is a story of the people and resources required to make the machines work. The gap between these two narratives is what is at issue in this paper.

Thesis

I will argue the need for “technological modesty – that is having a sense of the whole and not claiming or obtruding more than a particular function warrants.”⁸ If technology is to have a positive impact on teaching and learning the technological hype must be toned

⁷ Dosi, G., “Technological paradigms and technological trajectories,” *Research Policy*, 11, 1982, 148&152. Hereafter referred to in parentheses in the text

⁸ Postman borrowed this term from Paul Goodman. Postman, N. *Technopoly*, Toronto: Random House, 1992, 119. Hereafter referred to in parentheses in the text.

down. Perhaps of greater importance, the people behind the technology need to receive as much attention and fiscal support as the electronic infrastructure.

The technology integration policy puts too great an emphasis on improved learning and efficiencies through a technical infrastructure of computers and computer networks. In the new policy, technological potential and subsequent plans for technology have come close to allowing the computer vast sovereignty in the education system. The discourse creates an image of technological utopia. Technology is touted as a pervasive, neutral and transformative agent of change. These roots of the technology integration policy devalue the role of the educator and have justified ignoring the human infrastructure – that is the teachers, and support staff within the school. Unfortunately, even as the policy begins to address teaching needs, the framework limits the possibilities, funding and evaluation of reform to that which is technically possible.

In the schools, teachers are both exhilarated and exhausted by the technology initiatives. The top down policy inadvertently places teachers at the forefront of implementing technical changes but limits planning and avoids fiscal details required to support their efforts. For example, the policy prioritizes expenditures. Budget cuts have reduced teaching staff and all but eliminated the teacher-librarian.* Funding has been redirected to meet technical criteria such as ensuring a minimum ratio of computers per student, upgrading wiring and environmental controls in computer labs, technical training

* The professional status of the teacher-librarian includes an educational background in teaching, qualifications in library science and in many cases educational technology. "The trained teacher-librarian brings to the educational field a unique understanding of the relationship of the information function of librarianship to teaching and learning requirements of students" (Focus on Learning, 1985, 55).

opportunities and establishing technical outcome standards.

Teachers are taking on numerous roles related to technology including everything from training and technical support to media literacy. These requirements, included as mere presumptions within the policy discourse, offer new challenges for the teachers.

Preparation for class projects is intensified, curriculum expectations are increased, and technical upgrading means very frequent retraining. Teachers who are making the fullest use of technology are those who are working harder and putting in more time than ever before to ensure they meet the new requirements.

Positive results have also been apparent where a strong support network is offered within the school. Here responsibilities are shared and work is divided among educators, administrators and support staff. The professional qualifications offered by the teacher-librarian, in particular, can be an invaluable resource.

In contrast, there are many less-than positive responses to the technology. Many teachers seem simply overwhelmed and avoid technology. Unfortunately these teachers are being accused of being anti-technology luddites. There is little recognition that the policy itself creates expectations beyond that which it can support.

Technology can not bring about the promise of improved learning or efficiency in the system unless the people, time and resources required for using computers has been addressed. A technologically modest policy would put the educators and the educational needs before the machine. At the very least technical and educational needs should be addressed simultaneously. This paper outlines some of the missing policy details such as new teaching expectations, consideration of both a local and global culture, and the

disappearing support staff. It is people who can bring to fruition the promise of technology.

Methodology

Information about the government's policy and the policy process was readily available on the Alberta Education website. This includes press releases, official policy documents, and other literature regarding technology-related initiatives. To further investigate the government's effort I had the opportunity to interview John Travers, Chair of the School Technology Task Group.* We discussed the specifics of the policy process, including perceptions about the role of technology in the school, and the rationale behind the process. We also talked about the government's follow-up efforts as technology is phased into the schools.

To understand how and with what consequences the schools are implementing their technology in education objectives, interviews were conducted in urban and rural schools in Alberta. My study included elementary and junior high schools. There were three reasons for selecting kindergarten to grade nine. First, it was a way of managing the scope of the research problem. Second, many schools in Alberta host both the elementary and junior high grades. Looking at both levels meant it was not necessary to exclude these schools or to try to interpret the influences in schools with combined grade levels. Third and more importantly, I assumed computer initiatives would be relatively new at these levels of education. Elementary schools for the most part, and many junior

* John Travers, as Chair of the School Technology Task Group, is the senior bureaucrat overseeing

high schools were in the very early stages of using both computers and computer networks.⁹ However, it seems that junior high schools were more likely than the elementary level to have had some type of computer programs prior to the new initiatives in 1994.

Another interesting point I discovered is that the structure of junior high schools tends to be quite different from the high school level. There are specific subjects in junior high as with high school but the junior high schools often have a smaller student body and are less departmentalized. In grades six, seven and eight, teachers are more likely to collaborate on projects and are more likely to have greater interaction with the whole student body.

Since the thrust of my research was directed at teachers' interaction with technology, I focused on those areas where teachers, technology and students all come together. Teachers seemed to be very much on the front lines of the implementation activities and represent a culmination of interests including the students and school administration. To obtain the educator's position, I spoke with several principals, and a technology consultant working within the schools. I also spoke to many students ranging from grade one to nine. Although I will not be reporting specific student interviews, I gained an important context within which to interpret the methods and consequences of the

technology implementation for Alberta Education

⁹ High schools were excluded from the study based on an assumption that many schools at this level would have had computer-related initiatives in place prior to the new government agenda on connectivity. I learned, however, that the new technology policy might actually be more challenging for high schools to implement than middle and elementary schools. High schools, in general, are quite departmentalized between subjects and usually have an established computer program based on non-networked technology.

technology changes. The student interviews also offered key feedback on perceptions about the relevance of using technology in the classroom.

My findings suggest that the balance between technological and education needs is highly dependent on both the government's framework for technological integration and the choices individual schools and school districts make regarding technology. The administrative emphasis of the government policy is skewed in favour of technical fixes. Therefore, decisions within the schools come to play a critical role in swinging the pendulum back to the consideration of educational interests.

Schools where motivation and financial resources are readily available seemed better able to balance technical demands and new teaching requirements. In particular schools where teachers were offered a strong technical network in combination with local support, such as the teacher-librarian, technology appeared more likely to have a positive impact on both teaching and learning.

Chapter Overview

Chapter I, Government Policy: A Comparative Analysis

On initial review, Alberta's policy on technology integration reveals a thorough approach. The government has provided a gradual implementation process that has included everything from initial public consultation to continuous funding. 'There are,

The new initiatives attempt to introduce greater collaboration and integration of technology and resources. This goes against the grain of the single computer teacher who claims ownership of the computer lab.

* In 1998 and 1999 funding opportunities have begun to diminish, according to the dialogue generated on a

however, significant limitations to the technology policy. The shortcomings are highlighted through a comparison between the new technology integration initiatives introduced in 1994 and a similar policy introduced in 1985. The mid-eighties policy on library integration includes similar curriculum goals and represents early initiatives regarding computer and telecommunication technology. The 1985 library policy offers an interesting contrast to the new policy because it strives to develop a human infrastructure to balance new technological demands.

In the new policy technocentric rhetoric goes hand in hand with the new mantra of doing more with less. These underlying values mark a significant shift in policy priorities. Technical demand, cost-saving measures and goals of efficiency supersede staff support requirements. By 1994 human infrastructure to realize the promise of technology seems lacking.

Chapter II, From Policy to Practice

Chapter two offers a snapshot of technology implementation as it is being adopted in Alberta schools. As an example, one teacher's class Internet project is featured. This project was selected because it reflects many of the technology-based initiatives of other teachers I interviewed. The project generated considerable interest, as it exceeded the technology curriculum requirements, and offered a near perfect vision of technology in the classroom. The technical success, however, is only one aspect of this example project. The time and resources required to ensure the effective use of the technology is

equally important. Collaborating with other teachers, setting up databases, and reviewing and responding to email are all additional homework for the teacher. In this case review the policy implementation goal of efficiency is very questionable. Finally, the class project provides the opening scene on a story not valued by the policy discourse. It is the dialogue of the educator's role – a role that is critical but undervalued when evaluating the impact of technology on learning.

Chapter III, Technology in Perspective: A Resource Drain

This section of my research marks a shift from the government's utopian visions of technology to a teacher's enthusiastic but practical view. This view suggests that rather than generating any significant efficiency, technology becomes a resource drain. Teachers are discovering that new computer networking demands add to their work rather than increase productivity.

Technology as "just a tool" is part of the conflicting message found within new technology curriculum requirements. Teachers are expected to have students use computer and computer networks when researching and presenting their math, social studies, language arts and other projects. At the same time, teachers are expected to raise student awareness concerning the nature and impact of technology. Technology, therefore is not just a tool, it is a subject area unto itself. As "curriculum within a curriculum," the new tools in education intensify teaching responsibilities. The technological agenda, outlined in the government policy does not account for the added educational burden.

Chapter IV, Teachers Loose Valuable Support: The Teacher-Librarian

Addressing the new demands on teachers is the key theme throughout this thesis.

Technology integration places technical demands ahead of support for educators. A comparison between the 1994 technology and 1985 library policy highlights the significant shift in policy priorities. This is a change that has put an electronic infrastructure ahead of the human infrastructure.

The solutions posed in the library integration policy of 1984 conflict with the new cost efficiency rhetoric but prove, in practice, to offer the most successful approach to technology integration. This chapter provides evidence. An example has been selected from one school that is using the resources provided by the library and teacher-librarian. The librarian's interaction with students and staff, her passion for the potential of new technology, and her role in both supporting and teaching information and communication skills appeared to be central to the school's enthusiastic implementation of computers and computer networks. The impact of technology in this school appears to be very positive for both educators and students.

Technology planning and funding must simultaneously support technical and people needs. Technocentric values must give way to more realistic planning expectations. Teachers using technology require more support rather than less. This support must be available within their local setting. The teacher-librarian is an ideal candidate.

1 A Comparative Policy Analysis

In an attempt to evaluate the consequences of Alberta's technology initiatives, both in policy and practice, an interesting starting point is September 1985. Alberta Education released *Focus on Learning: An Integrated Program Model for Alberta School Libraries*, and *Policy, Guidelines, Procedures and Standards for School Libraries in Alberta*. Despite having different starting points, the 1984 library policy and the technology integration policy of 1995 share similar goals and themes. In 1984, reforms promoted effective library activities with a strong emphasis on teaching information and technology-based skills. The policy was designed to ensure collaborative efforts between the principal, teacher-librarian and the teachers. The library and the teacher-librarian were considered essential resources given the rising importance of information and communication skills. Communication, library, information management and critical thinking skills were at the forefront of the 1984 collaborative initiatives.

Almost exactly ten years later, the new integration plan was released in Alberta – technology integration in education. The nineties policy discourse also addresses communication, information and critical thinking skills. *In this new round of reforms, however, computer and computer-networking technology have supplanted the library and the librarian*. A comparison of the 1984 and 1995 policies illustrate the changed policy agenda in which planning, funding and supporting machines has taken priority over the people who make the machines work.

1.1 The Library Integration Model, 1985

In 1985, with the introduction of the library integration model, there was great apprehension and anticipation about computer and telecommunications technology as educational tools.

...Students live in a world fueled by change. A world of science fiction comes true.... Mediums have become the message.... Future shock jolts us daily as technology of our information society races ahead of knowledge and wisdom.... One compact disc can contain the entire text of all volumes of Encyclopaedia Britannica.... By the end of the decade nearly every North American household could have a computer capable of storing massive quantities of information. This information could take the form of printed words, computer programs, music, and voice data.

What implications do these observations and facts have for education in general, the school in particular and, most important, the student?¹⁰

1.1.1 Student outcomes: information and critical thinking skills

The library integration model suggests students learn how to focus and interpret media messages rather than getting caught up with the excitement of the medium. "Can youthful energies be focused on the messages of media so that students are not overwhelmed by minutiae" (Focus on Learning, 1985, 1)? In answer to the query, it is recommended students be taught how to "find, interpret, and synthesize meaningful messages" (Focus on Learning, 1985, 2). Student outcomes included learning how to retrieve messages, and using tools ranging from a library catalogue, telephone directory, and computer program (Focus on Learning, 1985, 8). Information processing includes

¹⁰ *Focus on Learning: An Integrated Program Model for Alberta School Libraries*, Alberta Education Media and Technology Branch, September 1985, p. 1. Hereafter referred to in the text as Focus on learning, 1985.

“formulating questions that will guide the research process and developing the vocabulary and critical thinking skills necessary to assess information from a variety of sources....” (Focus on Learning, 1985, 9). Students would also be encouraged to share information through a variety of forms such as written reports, posters, invitations, dramatizations and media presentations.

In 1985, information skills – the ability to critically assess media messages – were considered important. Enveloped in the “generic skills” of critical thinking were the desired capabilities of employing both primitive and new techniques and technology.

1.1.2 New teaching expectations: planning the support network

The library integration component of this policy comes into play as part of the collaborative effort required to integrate the demands of technology and information.

There is an acknowledgement that technology and information skills are not only learning priorities but also introduce new teaching expectations.

This policy makes explicit the need to support teachers as well as provide teaching resources. For example, locating appropriate resources for teaching activities and providing expertise in matching learning experiences are details included to encourage the success of new curriculum goals (Focus on Learning, 1985, 14). The model for integration identifies resource evaluation and selection as important planning areas.

“Careful evaluation and selection of these resources is necessary to meet student and curriculum needs” (Focus on Learning, 1985, 15).

The emphasis of the 1985 policy model is as much about how educators must plan and

manage new information and technology criteria as it is about student outcomes.

Technology and information resources, in this model, are only expected to improve learning if there is an effective partnership between the teachers, teacher-librarian and the staff administration. It is the educators who "...plan, implement and evaluate learning activities" (Focus on Learning, 1985, 2). The collaborative effort between the teacher-librarian and teacher is the highlight of this policy. The encouragement of their partnership offers recognition that effective use of "learning resources" requires specialization, planning and management on the part of the educator.¹¹

The policy goes into greater detail on how to manage collaborative efforts. Under the heading of "Finance Planning," the people, facilities, services, equipment, and materials required to achieve the desired results must be stipulated within the implementation process (Focus on Learning, 1985, 18). "Personnel Planning" is another key section. The teacher-librarian is recommended as one who can provide "specialized expertise in the area of learning materials" (Focus on Learning, 1985, 18). In addition, technicians, aides and volunteers are recommended to provide efficient technical services.¹²

In the library integration model challenges are identified in teaching and learning information skills. Avoiding "minutiae" and providing students with general skills to critically review media messages is the general goal. Teaching support is the main criteria for meeting this objective. The teacher is given the responsibility for ensuring

¹¹ Learning resources have been defined as "sources of information regardless of format" (Focus on Learning, 1985, 15).

¹² This is the first section of the model that encourages the goal of efficiency in the system. The model encourages "efficient procedures for the acquisition, cataloguing, and circulation of materials [to] be in

student outcomes but the policy encourages teachers to make full use of the support staff and resources in their local school environment.

1.2 The Technology integration Policy, 1995 in Comparison

There are significant similarities between the 1984 library integration policy and the 1995-technology integration plan. The goals for student outcomes are similar. The two policies diverge, however, in their context and approach to implementing the outcomes.

The 1985 policy speaks of uncertainty regarding the future and specifically a future with technology. It is "...a world fueled by change. A world of science fiction come true" (Focus on Learning, 1985, 1). Questions are raised about the "implications...for education, in general, the school in particular and, most important the student" (Focus on Learning, 1985, 1). Students are expected to "be better prepared to progress. They will be ready to learn how to anticipate, how to image alternatives and how to engage in lateral and holistic thinking." (Focus on Learning, 2, 1985). To achieve these learning goals the library integration plan sets out the criteria for supporting the educators. Educators and the cooperative partnership of the school staff are considered critical to student leaning.

In 1995, the Technology Integration Plan employs a much different language. As suggested in the title of the plan, machines rather than human resources become the focus of reform. Very early in the 1996 policy process it was announced that "technology is changing the world, transforming our work, and becoming increasingly crucial to the

place at the school district level" (Focus on Learning, 1985, 20).

success and prosperity of Alberta.” The chair of the MLA team on business involvement and technology integration suggests “to ensure that Alberta students are well prepared for the 21st century it is essential that we find affordable ways to integrate technology into the education system” (July 12, 1995)*.

The language and dialogue reflects a technological determinism about the necessity and direction of technology in education that did not exist in 1985. The language also hints at changing priorities in education reform. Planning and coordination of the technical infrastructure, high-tech skills and mechanics take precedence over labour coordination, information specialization and interpreting media messages. Technocentric overtones convey a sense that technology is something bigger than the education system and the student body. Deterministic phrases such as “technology is changing the world” heighten the value of machines and become the rationale for reform.

The “success and prosperity for Alberta” which is to ensue from technological reform interjects another important theme within the 1995 policy. Words such as prosperity and economic success combined with the goal of “find[ing] affordable means of implementation” and generating efficiency in the system are equally powerful motivators for reform.

1.2.1 Technocentrism

The technocentric language combined with new priorities for economic success,

* The MLA team is a group of Members of the Legislative Assembly in Alberta that was established in March of 1994 by Minister of Education Halvar C. Jonson. The team’s mandate was to study how best to

efficiency and cost effectiveness represents a significant shift in policy over the past decade. Unfortunately the new policy, while very thorough in the promise of technological opportunity and efficiency, places less emphasis on essential human resources.

Alberta is not alone in its changed stance. Technology-centered reforms are part of a worldwide trend in education reform.¹³ Michael Arnold, a teacher in Australia, suggests technocentrism is a significant flaw in education reforms. Arnold suggests that technocentric ideas limit the range of possible reform and more importantly becomes the rationale for reform.

Both the sociology of education and the sociology of technology are marginalized by the computing-in-education literature and by the proponents of the high-tech, post-Fordist school, to allow a narrow, starry-eyed technocentrism to take center stage. What Ellul (1990) has called "the problematics of technology" are therefore setting the agenda in that the technology is not made to be subservient to educational, social, or personal ends (Callister, 1994), but is in itself to be the problem and the solution.¹⁴

In 1985, media technology was discussed as creating new challenges for teaching and learning. Media content was cited as a significant hurdle to overcome as it introduced educational, social and personal challenges. The solution proposed in 1985 supported both teaching and learning how to interpret media messages. The teacher-librarian was considered a key resource that would offer specialized knowledge and support for both

integrate technology in education.

¹³ Computerization and telecommunication in education is very common in developed and developing nations (Schramm 1977) (Moll & Robertson, 1997).

¹⁴ Arnold, M. "The High-Tech, Post-Fordist School" *Interchange: A Quarterly Review of Education*, Vol. 27, Nos. 3-4, October 1996, 238. Hereafter referred to in parentheses in the text

teachers and students. The 1985 policy also provided consideration for teaching time and resource planning resulting from new demands to manage information including information retrieval, processing and sharing.

By 1994, technology was becoming both the problem and the solution for reform. The focus of technology curriculum had changed. Technical skills such as word-processing, database management, spreadsheet design, and desktop publishing were added to the student outcomes. Policy resolutions are limited to supporting the teaching and learning of technical skills. For example, teachers have access to training on how to use the Internet and other computer applications. Funding is also heavily biased towards purchasing computers and paying for computer technicians. School districts are prioritizing technology spending over other resources such as the teacher-librarian.*

The policy discourse has played an important role in promoting technology as both a problem and a solution. The MLA Team of Business Involvement and Technology Integration was given the mandate of discovering "...how best to integrate technology in education."¹⁵ From this beginning discussions about technology have been limited. The government was not, obviously, prepared to ask whether technology should be part of education. This is clear from the title and mandate given to the MLA team where integration is the key word. The then Minister of Education, Halvar Jonson established an integration advisory committee "comprised of individuals from a diverse range of

* An elementary school in St. Albert, Alberta housed a new computer lab with 32 high-speed computers and 35 Internet ports but could only afford a part-time librarian aid. According to the teacher I interviewed, "the professional teacher-librarian went out with the last round of provincial budget cuts."

¹⁵ *Government of Alberta News Release*, March 26, 1997 Hereafter referred in the text by the date of the

backgrounds, each with technology expertise.”¹⁶ By creating a panel of technical enthusiasts, rather than offering a mix of educational voices, the Minister was guaranteed that the policy agenda would not stray from its technical goals; that of upgrading computers and adding new networking capabilities would improve the education system.

Minister Jonson summed up the thrust of early initiatives. He is quoted as saying that “...[d]etermining the overall direction for technology integration in Alberta has been a critical step in improving our education system. Now we must take steps to turn vision into action” (March 27, 1996). The government’s goal was to establish legitimacy for its technological theory by way of asking questions about how to put technology in the classroom. From the start technology has been offered as the rationale for reform and this reasoning was justified in glowing statements about the impact of technology in education – the potential for improved learning and efficiency in the system.*

1.2.1.1 Dialogue of technological determinism

Technological determinism is “typified by sentences in which “technology” or a surrogate like “the machine” is made the subject of an active predicate...” and here it is exemplified in the education reform dialogue.¹⁷ It creates a narrative in which technology, as an independent entity, is the driving force of change (Marx & Roe Smith,

release. See: Planning at <http://ednet.edc.gov.ab.ca/news/1996nr/march96/framework/nr-framework.html>

¹⁶ *Technology Integration in Education – Discussion Paper*, by MLA Implementation Team, Alberta Education, Alberta, July 12, 1995, i.

* “Technology is a tool not an end” is a statement made in the framework document. It seems to be act as a disclaimer but very little is written to support the claim.

¹⁷ Marx, L. & Roe Smith, M., “Introduction” *Does Technology Drive History? The Dilemma of Technological Determinism*, Ed. by Merritt Roe Smith and Leo Marx, Cambridge: The MIT Press, 1994, x. Hereafter referred to in parentheses in the text.

XI). What is technologically deterministic are initiatives expressed in terms that imply those decisions about educational change are mainly technical in nature and value-free.

Deterministic statements about technology reflect the "...belief that all human history and experience is neatly determined by the constraints imposed by technology" (Baran & Davis, 1995, 328). According to the MLA team Chair, "that discussion paper (the 1994 paper on integration) proposed a vision and strategy for an education system transformed by technology."¹⁸ "Technology is both a catalyst that propels change and a tool that makes change possible," reads a quote included in the discussion paper.¹⁹ Five years after the discussion paper was released the technological hype remains deterministic. In the Interim program of studies document, technology is said to be "...causing the process of education to undergo phenomenal changes."²⁰ These statements help to suggest that "[o]ur fate is in the hands of media technology and we are constrained to go where ever it leads..."²¹ Technology rather than a specific education need has provided a strong incentive for change. John Travers, chair of the School Technology Task Group (STTG) suggests that benefits are coming from the networking of computers more so than just an isolated machine. Connectivity was one of Travers' main themes. "*It's the connectivity*

¹⁸ *The Framework for Technological Integration: A report of the MLA Implementation Team on Business Involvement and Technology Integration*, Alberta Education, Alberta, March 1996. Hereafter referred to in the text as (FTIE, March 1996). See: Planning at http://ednet.edc.gov.ab.ca/news/1996nr/march96/framework/frame_doc.html

¹⁹ Quote is taken from *The Electronic School*, September 1992 and used in the *Technology Integration in Education — Discussion Paper*, by MLA Implementation Team, Alberta Education, Alberta, July 12, 1995, 3. Hereafter referred to in the text as (Discussion Paper, 1995).

²⁰ *Information and Communication Technology, Kindergarten to Grade 12: An Interim Program of Studies*, Alberta Education, Curriculum Standards Branch, Alberta, June 1998, 2. See: Projects: <http://ednet.edc.gov.ab.ca/technology/> Hereafter referred to in the text as (Interim Program of Studies, June 1998).

²¹ Baran, S.J. & Davis, D.K. *Mass Communication Theory: Foundations, Ferment, and Future*, Belmont,

that is, and the functionality that comes from that, that's driving the system forward"
says Travers.

1.2.1.2 Connectivity "technology touches everything"

According to Travers, "technology is forcing us to rethink our departments and school structures." Travers offered the example of administrative improvements. Before the advent of computer networking and telecommunications technologies, the administration was horizontally structured. Now, according to Travers, departments are melding together into a more vertical structure "...taking the curriculum function, financial and planning groups and moving them into a task group" — All of this because of connectivity. It suggests that every aspect of the education system will be affected because everything will be electronically linked. "Technology touches everything, it seems," says Travers.

Connectivity, therefore, helps define the role of the educational problem and provides great promise as a solution. The conveniences of technology are promoted in all areas of the education system. In the *Implementation Plan for Technology in Education* the goal for technology is "...to improve student learning and enhance the efficiency of the system."²² The document goes into more detail on the provincial government's plan to achieve results in all areas of education, from the student to the school authorities and the provincial education department itself. Teachers are expected to enhance learning by

CA: Wadsworth Inc, 1995, 328.

²² *Implementation Plan for Technology in Education* (Brochure or webarticle), Alberta Education, Alberta, November 1996, 3. See: *Planning* at <http://ednet.edc.gov.ab.ca/technology/>. Hereafter referred to in the

access to information and collaborating with each other through technology. Principals and Superintendents are also expected to have better collaboration capabilities and “[s]chools, school authorities and the department will be electronically connected for better communication and ultimately for improved student learning” (IPTE, November 1996, 3).

Students are expected to use multimedia resources to help learn difficult concepts in all subject areas (FTIE, 1996, 10). The goal is to have “[p]rovincial curriculum reflect a systemic integration of technology in how and what students learn” (Discussion Paper, 1995, 6). At each level of the system there is also hope that educational accountability will be improved. According to a recommendation in the *Framework for Technology Integration in Education* “multimedia resources [should] be used to “help teachers, schools, school boards, and the Minister of Education manage, monitor, and assess student progress” (FTIE, 1996, 4). Student learning is also expected to benefit from technology.

1.2.2 Economic Prosperity and Improved Efficiency

Computers and computer networking require substantial resources and a significant assurance of returns for the education investment. Therefore, cost-benefit analysis comes to the forefront to justify such policies and the emphasis of reform becomes skewed toward productivity (Schramm, 1977, 108). The long-range payback of such policies are alleged to be greater than the costs. In Alberta, a cost-benefit analysis has been drawn

text as (IPTE, November 1996).

from rhetoric of the information age and the potential for economic prosperity.

Assurances that there will be a skilled labour force for the future is a key output goal.

According to the interim curriculum document, “[i]n a society that is moving from an industrial economy to an information one, our students need to have technological skills for their future (Interim Program of Studies, June 1998, 1). Another goal is to promote the political and economic prestige of the province. The following quote offers a good example of the rhetoric of economic prosperity that is a common theme in the policy:

The future of our children and the future prosperity of Alberta lie in the ability of our students to be successful, productive citizens. To ensure that all our students have the best advantage possible, Alberta must continually look for new ways to improve student learning. Technology has become an essential tool in continuing to provide Alberta students with a relevant, quality education in the 21st century. *Our success in the global economy depends, in part, on the effective integration of technology in education.*

(FTIE, March 1996, 1, *emphasis added*)

Tales of prosperity are only one aspect of the cost-benefit analysis. According to the policy material, educational productivity will occur as a result of increased efficiency.

James and Tia Rice Donlevy, who have characterized several different types of education reform literature, note that technological models of reform often herald efficiency as a significant motivator for change (1996, 108).

Michael Mulreany comments on the motivation for efficiency in a public sector. He suggests that the “...interest in value for money in the public sector is not new but it has acquired a new lease on life in recent years in line with attempts both to control public

expenditure and to allocate this expenditure among ever increasing demands for services.”²³ William Boyd in “The Power of Paradigms: Reconceptualizing Education Policy and Management” describes how dominant ideologies have played out from the 1960s through to the 1980s in education reform. In the 1960s, Boyd argues school policy was an “internally oriented, closed system, [with a] social psychological approach to organizational theory...consistent with the human relations school of thought. This approach tended to focus on social psychological processes within organizations, assuming that these processes, when healthy, would produce desirable organizational outcomes.”²⁴ These assumptions were based on the idea that if people within the system were happy things would run smooth. There was no questioning the qualifications of instruction once teachers were hired and the quality of the education establishment was assumed to be sufficient. The only acceptable intervention was that of ensuring good relations. This applied to the administration, teachers and students. Boyd suggests there was a paradigmatic shift brought on by changes in the economy. According to Boyd,

The 1970s brought us the OPEC oil embargo, recession and stagflation, the ‘fiscal crisis of the state’... and the beginning of a massive restructuring of the world economy. Western nations found themselves increasingly unable to compete with the new Pacific Rim powers in manufacturing...

These economic developments and dislocations brought about the tight budgets and pressures for greater efficiency, economy, and productivity that transformed the political scene.... There was an unraveling of the faith

²³ *Efficiency and Effectiveness in the Public Domain*, Ed. T.P. Hardiman and Michael Mulreany, Institute of Public Administration, Dublin: Ireland, 1991, 19. Hereafter referred to in parentheses in the text.

²⁴ Boyd W.L. “The Power of Paradigms: Reconceptualizing Educational Policy and Management” *Policy Research and Development in Canadian Education*, Edited by Robert O’Reilly & Charla Lautar, Department of Education Policy and Administrative Studies, University of Calgary, Calgary, AB, 1991, 9. Hereafter referred to in parentheses in the text.

in the welfare state and in interventionist central governments committed to social justice and reform.

(Boyd, 1991, 15)

The result of world events, private initiatives and public policies was an ontology of 'thriftiness' — doing more with fewer resources — for the purpose of remaining competitive or cost efficient. Boyd refers to the eighties as a 'market-driven' paradigm, which promotes competition within and among schools to ensure greater efficiency and better accountability to the parent as a consumer of education. Marita Moll & Heather-jane Robertson, at the Canadian Teachers Federation argue that "cost efficiency and effectiveness rhetoric" predominates as "provincial governments are caught in the globalization vice...seeking to consolidate control over an essential part of their jurisdiction (education)."²⁵

Michael Arnold concurs that the primary value of efficiency in education is part of a popular new discourse of education reform. He suggests that "[I]n the last decade,... traditional discourses of educational theory and practice have been joined by entrepreneurial, post-Fordist discourses employing rhetorical agents such as the *client*, *consumers*, *markets*, *parental choice*, *educational entrepreneurship*, *world's best practice*, *performance indicators*, *quality management*, *user-pays*, *contracts*, *outsourcing*, and *downsizing*" (Arnold, 1996, 230). Donlevy and Donlevy have also suggested that the technological model of education reform closely matches the goals of

²⁵ Moll, M. & Robertson H.J. "Backwash from the Technological Wave; Critical Perspectives on the Impact of Information Technology on Public Education" A presentation to Learned's Conference, Memorial University of Newfoundland, June 12, 1997, 6 (unpublished).

private enterprise.

Essentially it is the language of business in which the prime objective is to reduce inefficiency and produce at the lowest possible cost. "Private enterprise is said to be inherently more efficient and more responsive to demand than public enterprise.... It is said that schools can do a better job and realize the same efficiency and effectiveness alleged to have occurred in the corporate world if they adopt the aims, style, ethos, structures, and methods provided by post-Fordist management theorists" states Arnold (1996, 234).

In the early 1990s, public expenditure and business ethos was at the forefront of the Alberta government's agenda. The government under Premier Ralph Klein was dedicated to increasing the wealth of the province by reducing public expenditures. The education budget was a significant target of the Klein government. Marita Moll at the Canadian Teacher's Federation has summarized some of the government's tactics.

Alberta has cut \$224 million from the education budget since 1993. Spending decreased by \$466 per student between 1993/94 and 1995/96 according to Alberta Education's 1995/96 annual report. At the same time, the Alberta Teachers' Association Report on Educational in Alberta, 1996 indicated that "63.5 per cent of teachers have fewer resources to help children. Guidance counsellors, reading specialists, teacher-librarians and teacher' assistance have been cut back.

(Moll & Robertson, 1997,8)

"'Budgetary stresses' induced by reducing expenditure targets or by restricting the income of a government agency..." is one, albeit, crude method for ensuring efficiency according to Mulreany (1991, 9). Moll suggests many provincial governments across

Canada, not just Alberta, have used this tactic of 'budgetary stress' as a means of legitimizing reform efforts. "To gain political support of substantial change in schools is difficult as long as the public remains satisfied. *The accomplishment of schools must be diminished*. Then, 'in the public interest,' the current system must be starved to the point where it can no longer deliver on its promised goals and objectives," says Moll (1997, 7 emphasis added). Staffing cuts between 1993 and 1996 generated significant concerns about the capabilities of the public education system. Teachers, and teacher-librarians were both targets of provincial streamlining efforts.

Once limited resources significantly diminished the credibility of public schools in Alberta, the provincial government began a process of reinvestment and reform with the prime goal of ensuring efficiency in the system. Parental choice in education, performance indicators, reduced duplication, streamlining resources, and replicability was all goals to be achieved by electronically networking the education system.

1.2.2.1 Streamlining Resources

Administrative tasks such as student evaluations and the maintenance of student records become easier, require less processing and retrieval time, become more transferable, and eliminate duplication. Teachers now have the ability to enter student marks into specially designed software programs that will produce report cards and transfer the data directly to district offices. This new process promises to eliminate several administrative steps in the assessment process, saving time and resources. Edulink is an example of a software-based program used by schools districts throughout the province to exchange data. According to the Edulink homepage, the "goal is to replace paper driven processes with

the electronic management of data.”²⁶

1.2.2.2 Replicability

Teachers and administrators are also expected to benefit from the collaborative opportunities provided through quick e-mail communications. The creation of websites such as the Telus 2Learn site is a new forum for teachers to share ideas or “best practices.”²⁷ Telus and several other education groups in the province jointly sponsor the site.²⁸ Teachers can seek out professional development support, find collaborative classroom projects, and access an assortment of potentially relevant links to other Internet sites. The concept of replicability or “best practices” is a common aspect in the technology in education literature (Arnold, 1996), (Donlevy and Donlevy 1996). It goes hand in hand with the goal of achieving more despite having fewer resources.

1.2.2.3 Best Value and Reduce Duplication

Provincially coordinated purchasing plans for teaching and learning resources are another thriftiness mechanism. The goal is to “achieve “best value” and reduced costs for taxpayers” (FTIE, March 1996, 10). A deal between the Claris Corporation and Alberta Education, which allows Alberta to purchase Claris software at significant discounts for the next two years, is one of several cost-saving projects established by the

²⁶ Edulink Homepage, see: <http://www.edulink.ab.ca/>

²⁷ 2Learn Homepage, see: <http://www.2learn.ca/mapset/mapset.html>

²⁸ The Alliance, Telus Learning Connection: The Partners. See: <http://www.2learn.ca/mapset/about/alliance.html>

government.”²⁹

Under the heading of “Planning and Coordination,” the intention is to ensure that schools across the province integrate technology in an equal and unified manner. The goal is to reduce the “duplication of programs and services” (see appendix 1). Mulreany suggests that methods for reducing waste often focus on market related concepts such as competition, audits or “efficiency ‘scrutinies,’” designed to uncover waste. These are also commonly referred to as accountability measures (1991, 9). Recommendations for planning include that all “schools and school boards be required to develop technology integration plans” with the intent of ensuring accountability of investment (FTIE, March 1996, 12). The Interim Program of Studies also serves as a tool to avoid inefficiencies and provide educational audit information. It sets curriculum outcomes, which allows for the monitoring and measurement of teaching and learning through technology. “Learning achievement is the critical product of the education system....” says Goodman (1995, 11).

1.3 Prioritizing machines and de-emphasizing teachers’ work

The goal of ensuring an efficient system as a result of technical gadgets is also evident in what is stated and not stated about teacher’s work. In 1995, the MLA Team on technological integration suggested “we need to establish a strong consensus on the direction to take and on how to make it happen. It will mean setting priorities...” (Discussion Paper, 1995, 2). The policy process did indeed set a priority. It is a priority based on technical requirements.

²⁹ See: Software, <http://ednet.edc.gov.ab.ca/technology/>

1.3.1 The Technical Priority

Technocentric overtones in the policy discourse imply that tools will generate efficiency, allow teachers to do more with fewer resources and bring instant rewards. Details about the structure, time, and resources required to link the technical needs with new teaching responsibilities are limited within the policy framework. Alberta Education admits to focusing on the technical infrastructure and is slowly trying to improve support resources for teachers. “[H]elp is on the way...” is the promise included in a “best practices” document.³⁰ The initial framework for integration weakens even these initiatives. Faith is placed in the philosophy that if a technological network is constructed benefits will ensue. As a result of strategic planning and technological hype, the schools have been given an inherently technical framework for implementing and evaluating broad educational reforms. Access, support and ethics are all framed in such a way that they contribute to the technological paradigm in which each is defined by technical criteria.

1.3.1.1 Access

The first step in the policy process is to ensure Internet access and minimum student-to-computer ratios. The plan for technological implementation “...acknowledges that we have to move ahead initially on hardware, software, networks, infrastructure and developing the skills of Alberta’s teachers all at the same time” (IPTE, November 1996, 1). The technical infrastructure and training are seen to be of paramount concern. “All students, no matter where they are, must have equal access to technology” states John

³⁰ Preparing to Implement Learner outcomes in Technology: Best Practices for Alberta School

Travers. The standard of one modern computer for every five students was set along with the goal of connecting every school to the Internet within one year (March 26, 1996).

In working towards the goal of equal access, funding was directed towards purchasing computers, improving wiring and upgrading old systems. The government also offered an initial grant for Internet access (March 26, 1996). The Alberta government worked with other governments, community groups and businesses to gain access to more computers and better Internet connections. The Computers for Schools Initiative is, for example, "a national program... co-sponsored by Industry Canada, The Telephone Pioneers of America, Region I(Canada), Alberta Education, the Alberta Teachers Association, the Alberta School Boards Association, and the Canadian Association of Principals.³¹ This initiative is designed to supply, free, refurbished computers and related hardware and software to Canadian schools and libraries. (STTG, 4).

1.3.1.2 Ethics

Technical solutions are also advanced as the main mechanism for addressing ethical concerns. New computer and telecommunications technologies have introduced concerns about privacy, security, and personal safety. The realm within which these questions have been addressed is generally limited to technical problems and solutions.

Responsible use policies are recommended for all schools to ensure teachers, students and administrators demonstrate care and respect when using technology. Unfortunately, there

Jurisdictions, Alberta Education, Alberta, February 1999. See: <http://ednet.edc.gov.ab.ca/technology/>. Hereafter referred to in the text as (Learner Outcomes in Technology, 1999)

³¹ School Technology Task Group (STTG) Document, Alberta Education Website. See:

is a greater emphasis on caring for the machine than caring for the users. In a guide for school board planning, security, for example, refers to the security of the system itself or of data, rather than the security of the students or teachers to the extent that people are considered a threat to security. “When determining security needs consider – people threat (human error, hackers), physical threat (fire/water damages, electrical outages, vandalism, viruses), funding to maintain security, networking security needs, computer security used, location of the security systems, software security, data backup provided.”³² This somewhat extreme example helps to demonstrate the limited direction of government’s technical frame.

1.3.1.3 Technical Support

Funding for technical computer support is a weak aspect of the overall plan but a greater concern is that the notion of support is limited to technical issues.

Support services refer to the maintenance, repairs and upkeep of machines. Staff support is limited to having access to an electronic network and individual training and development. Under the heading of “Staff Support” in the technology planning guide, school boards are urged to “consider providing all staff with appropriate hardware and software tools to effectively perform their responsibilities”(HTP, 1997, 5). Technology training offers another example of technical-focused support. The guiding principles documents suggests “staff should be supported in their technology learning and in the

<http://ednet.edc.gov.ab.ca/technology/> Hereafter referred to in the text as (STTG).

³² Handbook for School Board Technology Planning, Alberta Education Website, February 1997 –Draft, <http://ednet.edc.gov.ab.ca/technology/> Hereafter referred to in the text as HTP, 1997, 6.

effective use of technology resources for both instructional and administrative purposes, through access to associated personal development and training opportunities.”³³

Teachers will also be able to use their newly developed technical skills to look for additional teaching support through the media. “Multimedia teaching and learning resources will be available to help teachers make the transition to an information and technology-based curriculum”(IPTE, 2).

1.4 Chapter Conclusion

A lesson taken from the earlier, 1985, library integration policy is that teachers face many new challenges when it comes to technology. These are challenges, such as information management and critical thinking – that need a variety of support staff. Providing professional teaching staff with teaching aids, support staff and information specialists within the school environment, was essential in the 1985 documents to effectively use technology and teach information skills. While these challenges continue to represent important aspects of the technology integration policy they are not considered in planning for staff support.

Communication and partnerships between the principal, teacher-librarians, and teachers were considered critical in 1985 to the success of the meeting new information challenges. The successful implementation of the plan was based on dividing up the anticipated responsibilities between the key partners. Teachers were responsible for encouraging “resource-based learning” and meeting curriculum demands (Focus on

³³ Information Technology Guiding Principles, Alberta Education Website. See:

Learning, 1985, 56). The professional status of the teacher-librarian was important because of their educational background. The teacher-librarian trained to be a teacher, also has qualifications in library science and in many cases educational technology. "The trained teacher-librarian brings to the educational field a unique understanding of the relationship of the information function of librarianship to teaching and learning requirements of students" (Focus on Learning, 1985, 55).

In 1984 the library integration policy may have lacked the foresight of technical demands. There is little excuse for the lack of understanding of the role and importance of people in the 1995 policy. Support services should include more than just people to fix machines. Staff with expertise in the area of information management, who can respond to student needs, and can teach students to critically assess the media are equally as important as the technical support.

Unfortunately, goals of efficiency and technocentrism preclude a discussion of the human support network for teachers. The discourse of technology integration focuses on technology as both the means and the ends of reform. Technology is expected to provide a conduit for new resources and facilitate new skills. The technocentrism promises machine-generated efficiencies and creates a hierarchy of reform solutions with technical concerns given top priority. Establishing a baseline for the number of computers per school, ensuring a network infrastructure, training teachers to use the computers, and funding technicians to keep machines working are all components of the technical focus. Planning details such as new demands on the organization and teaching staff are

noticeable by their absence.

2 From Policy to Practice

Where the policy has emphasized a technical paradigm for evaluation, it is important to consider how the staff within the schools is adopting the government's policy. In May of 1998, I visited 11 schools across Alberta in a cross section of urban and rural settings, affluent communities and more high-needs environments. Although this is not a large sample it did offer a snap shot of the relatively early stages of technology implementation in the schools.*

Between the statistics available and my observations, the technical picture of technology integration in Alberta schools appears to be on a fast track, exceeding or at the very least meeting the expectations of the provincial government. The interesting aspect of my findings was how much work was involved in linking the technology and educational requirements. In schools where technology generated enthusiasm, where it was fully integrated and met the government's technical demands, the personal energy of select staff made the biggest difference in how technology impacted on learning.

The time, energy, and resources expended by dedicated teachers seem vital to the successful integration of technology. These findings stand in contrast to the policy rhetoric that systematically ignores these realities of teachers' work. In a discourse of technological potential and thrifty reform, the role of the educator is conveniently

* I consider it an early phase of implementation despite the fact that the government has offered grants for technical infrastructure since 1996. The common reaction within the schools was that the curriculum outcomes put pressure on the schools to get the technical infrastructure in place. Interim curriculum was not set until June of 1998 and the actual curriculum outcomes will be evaluated beginning in the year 2000.

sidelined. The following section illustrates the technical success of implementation but also acts as a prelude to the difficulties of a technocentric reform agenda.

2.1 Striving to Meet the Technical Agenda

Schools with a small student body, usually less than 200 students, had one computer lab. Schools with a student body of 200 to 500 students had 2 computer labs. Computers were also dispersed throughout the classrooms. The number of computers in the classroom ranged in both number and quality. Very few classrooms were without a computer. It was very common to see one computer and in several cases there were between two and four computers in the classroom. The new computers, with the latest upgrades, were usually reserved for the labs and classrooms housed older computers with limited capabilities.

The number and type of Internet connections also varied significantly from one school to the next. According to John Travers at the school Technology Task Group, almost 95 percent of Alberta schools had some kind of Internet access by 1998. Rural schools could, generally, not support as many or as sophisticated connections because of issues such as bandwidth. Some schools were reported as having as many as four Internet connections per classroom while other schools had only a handful of connections for the entire school.

Enthusiasm for the new technology also seemed to vary between schools; however, a

Therefore during my visit in May of 1998, it was not expected that technology-related skills be integrated throughout the traditional subjects.

common pattern did emerge within the 11 schools that I visited. One teacher made the astute observation that you can tell how a computer is used based on where it is located in the classroom. Most specifically, he was referring to those situations – a common scene – where there was only one computer in the classroom. The teacher observed that in his school, of 400 students, two teachers were quite enthusiastic about integrating new technology into the curriculum, a couple of other teachers were slowly starting to show some interest and the rest had computers on their desks for mainly administrative purposes. In almost every school I visited the pattern was very similar. Many teachers were required to put their marks directly on the computer and therefore were given computers to ensure that task was completed. Many of these teachers had not moved beyond the administration function of the computer. A computer on the teacher's desk versus computers in the hands of students seems to be an objective measure of teacher enthusiasm.

Those teachers who demonstrated an interest in computers also professed to have made personal efforts to ensure that a computer infrastructure and curriculum initiative were part of their school programs. Therefore, in addition to the official policy incentive to integrate computers, it seemed to be the personal energy of these few teachers, backed by supportive administration, that drove the process forward.

Perhaps the best way to illustrate the dedication needed to integrate technology into the classroom is to start with a quick sketch from a class I observed. In this example, as with many similar examples that I encountered, an evaluation based on policy criteria appears highly positive. This example also helps to illustrate the limitations of the evaluation

criteria. The policy framework leaves little room for acknowledging the new teaching demands.

2.2 *The Ducky Project*

Craig, a grade one student at a public school in Calgary Alberta was very excited to show me the ducky web page.* This was his class' site on the Internet, which featured results from observing eight duck eggs. The students were tracking the growth and hatching of the ducks.

After the teacher spent about 15 minutes trying to get the site online, Craig was able to demonstrate his newly acquired reading skills as he navigated through the ducky site.*

He was very comfortable with using computers, using the mouse to illustrate the links to different pages and seeming to understand the technical computer language. In simple terms he described the results in a database of daily observations. He also showed me links to other grade one classes working on the same project.

It was not, however, necessary to be on the computer to feel the excitement generated by the ducky project. There were paper ducks hanging from the classroom ceiling. Big charts hung on the wall to display changes in the eggs, and the librarian's ornamental duck collection was displayed in the adjoining library. Most of the excitement though, radiated through the children as they gathered around the incubator at the front of the class. The grade one teacher, Ms. Brown came up with this project which was about life

* Names of the students have been changed

* Learning to read is a very important part of grade one curriculum but not all students are successful in

and death.’ In many ways it demonstrated the bridging between nature and technology. It encompassed a science lesson, language arts, technology and communication.

Craig and his fellow students reported the changes in the duck eggs through the incubation period by writing in their journals. They spoke to the experts on ducks, they read books about ducks and they made inquiries using the Internet. The students helped the teacher conceptualize the web page and used their Internet site to interact with other grade one classes who were also observing duck eggs. Email is another tool the teacher used to generate information and communication about ducks.

Only a small portion of the overall project involved the computer and the student’s interaction was very limited. However, the teacher did manage to fulfil many of the curriculum requirements established for grades one to three. The class learned how to “compare similar types of information from electronic sources” by reviewing each of the participating grade one websites.³⁴ They learned how to access information from an electronic source (Interim Program of Studies, June 1998, C1, 1.1), how to access hyperlinks (P2, 1.5), and how to read from a prepared database. The outcomes require that students create text using a wordprocessor and require students to use computer edit functions; however, Ms. Brown reserved the creation of text to simple entries in a paper

mastering the established grade one reading level.

* The class experienced technical difficulties when the incubator overheated the first eight eggs and Ms. Brown was left with the task of explaining that the eggs were still in the yolk stage and there were not fried ducklings as a result.

³⁴ *Information and Communication Technology, Kindergarten to Grade 12: An Interim Program of Studies*, Alberta Education, Curriculum Standards Branch, Alberta, June 1998, p.2. See: Projects: <http://ednet.edc.gov.ab.ca/technology/> Hereafter referred to in the text as (Interim Program of Studies, June 1998).

journal so the grade one students would learn the basic alphabet before introducing the keyboard. She also limited the editing function to the eraser. Each week, Ms. Brown recopied a selection of the student's journal entries onto the class website.

The teacher also facilitated email communications. She initiated a dialogue between the participating classes and made contacts with duck experts and other people interested in the project. (This is how I first made contact with this group of students in Alberta.) Ms. Brown's usual routine was to process the email through her own personal account at home and then report back to the students for their feedback. Technically, the class helped to compose email messages which is one of the curriculum requirements but they did not go through the mechanics of "communicating electronically with people outside the classroom" (Interim Program of Studies, June 1998, P6, 1.1 & 1.2).

The students also helped conceptualize the electronic presentation of their findings. According to the teacher, the class collaborated on both the information and design of their webpage, which represents a significant aspect of the "communicating inquiring, decision making and problem solving" category of the learner outcomes. For example, students are expected to "use technology to support and present conclusions" and "use technology to organize and display data in a problem solving context" (Interim Program of Studies, June 1998, C6, 1.2 & 1.3). Ms. Brown sent the original webpage design and updates to a technology expert at the district office who put together the electronic format and created the necessary databases for tracking results. Ms. Brown was responsible for updating the findings several times a week.

In addition, to meeting the technology curriculum goals, the ducky project is also an

exemplary model for a new style of teaching and learning. Station-based teaching, one of the revolutionary changes expected to have developed along side computer reforms, is rooted in the vision that students learn in small groups while the teacher acts as a facilitator. This method was widely praised because it avoids the more traditional lecture style of teaching. The main thrust of the idea is that knowledge is not transferred from the teacher to the student but rather that the student discovers knowledge. Ms. Brown utilized the station-based approach very effectively as I observed three to four students grouped together working simultaneously on a variety of tasks.

The ducky project, in general, created an image of children using computers in the classroom very much in line with John Travers' vision for technology. According to Travers:

I see three kids sitting around talking about a topic. Maybe it is the issue associated with development and the ecological preservation of Alberta's forests. They are debating the issues, they may be involving students from another school and it so happens a computer there, but, *it is just another tool in their environment... It is just another tool in the mosaic* that will help us to bring relevance and interest and excitement to education.

The technical components of the ducky project did add a new element of interest and excitement for the grade one students. They were exposed to a new medium for information retrieval and presentation. The teacher's email communications presented the students with a new way of developing contacts and relationships beyond the boundaries of their school.

2.3 Chapter Conclusion

This innovative project is very similar to many others I learned about in interviews with

teachers from grade one to nine. The ducky project and projects like it offer a promising example of new computer and computer networking use in the classroom. The project exceeds the new technology curriculum goal. Technical skills were integrated with subjects; students were learning computer-related skills and were able to communicate with people outside their classroom. The class also presented a very attractive report in the form of a webpage. In regards to improved student learning, this project seems to indicate that students learned how to use new techniques for discovery and presentation. As an outside researcher, it is difficult to assess whether they actually acquired more knowledge about the subject.

In contrast to the enthusiastic images of technology, these electronic tools introduce a whole new range of work for the teacher. The promise of efficiency is less than apparent in this example. In fact, the tool and technical requirements seemed to be a considerable resource drain.

The teacher's role in creating, organizing and maintaining the ducky project is the story generally ignored by government assessment mechanisms. The government has established a plan to ensure technical access such as the ratio of students to computers or the number of Internet connections. It has a set process to ensure that new teachers meet a certain technical standard, and the government has developed specific information and communication curriculum to monitor student technology skills. These accountability goals are designed to evaluate the impact of technology. Judgements about the impact of technology in the classroom can not be completely understood until there is recognition of the people and labour required to make the machines work.

3 Technology as a Resource Drain

Telecommunication technologies are, as Wilbur Schramm has characterized it, “big media.”³⁵ This is to say that the technology is both costly and requires considerable infrastructure. To extend Schramm’s notion, big media also significantly add to the demands on staff responsible for making the technology work. So when technology is referred to as “just another tool in the mosaic” it is important to think of the overall impact of the technology*. In the Alberta school system there are two criteria for measuring the impact of technology. The first is in terms of meeting policy goals, which have focused on simple cost-benefit analysis such as technical costs in relation to the computer/student ratios. The second indicator is based on the evaluation of student outcomes. I will argue that neither adequately account for the impact of technology.

In the case of Ms. Brown and many other teachers I interviewed, integrating computers and the Internet introduced rewards but also brought new demands on their time and the school resources.* These demands are not necessarily unwelcome but cause concern because they are not recognized within the policy framework. Within a discourse of technology-generated efficiencies the emphasis is on technical opportunities rather than on the people and processes required to make use of technology in teaching and learning.

³⁵ Schramm, W., *Big Media Little Media: Tools and Technologies for Instruction*, California: Sage Publications, 1977, 16.

* “Just another tool in the mosaic” or “Just a tool” is a common disclaimer in the technology in education discourse. Both quotes were introduced in chapter two of this paper.

* Ms Brown created the ducky project for her grade one students. The project was designed to aid in the instruction of communication, presentation and information acquisition using the Internet. See the previous chapter for more details about the project.

There is a philosophy that if the technical infrastructure is in place, technical training and technicians are provided, and a technical curriculum is designed then it follows that efficiencies and improved learning will ensue.

It is the work of teachers like Ms. Brown and the staff that supports these teachers that ensure technology has a positive impact on student learning. In the current model of technology integration teacher's work has been significantly increased but is not recognized by the authorities. Teachers bear the weight of financial shortfalls and cost saving techniques. Teachers have taken on the role of local technicians in their schools, they have sacrificed class time to train other teachers, and they face the frustrations of regular computer malfunctions and must accommodate their teaching styles to comply with the availability of computers.

The new technology curriculum also introduces a new dimension to teachers work. In addition to teaching traditional subjects they must help students learn how to work the technology. Unfortunately, the framework for technology integration does not fully consider the degree to which teacher's work is effected by the new technology.

Jean-Claude Couture has noted that "...computer technologies are represented by governments and school boards as a means to enhance student performance without having to commit sufficient resources to achieve these goals" (1997, 141). The burden of improved learning is left to the ingenuity of each individual teacher and his or her technical competency. To borrow a term used by Couture, teachers are living in a "culture of insufficiencies."

3.1.1 Teachers as Technical Support

The discussion paper on technology integration in 1995 recommends that "...teachers are not taken away from primary teaching responsibilities in order to perform technology support roles."³⁶ Despite this recommendation, the reality is that teachers are often assigned or volunteer for the role of computer support. This has included writing funding proposals, purchasing new equipment, setting up labs, and reviewing new hardware or software options. Many of the teachers I interviewed were acting as on-site technical support. Most districts provided some form of technical support but because this is a shared resource demand is usually greater than supply. There is a need to have someone within each school to address relatively simple computer problems. Unfortunately, none of the schools I visited could afford to pay a computer specialist and relied instead on a local teacher. The teacher is on call when other staff faces technical difficulties. The technicians I spoke with admitted with regret that their teaching responsibilities had been affected. According to one teacher, "my students have had less of my attention this year and it has really had an impact on the students, especially, those with special needs."

3.1.2 Teacher Trainers: Support for teacher's learning

In addition to being the computer experts in the school, the teachers who took on the role of technical support, also took on the role of teacher trainers. Some of the teachers did this in a very casual way. They were the computer enthusiasts and it just became natural for other teachers in the school to rely on their expertise and interest.

³⁶ *Technology Integration in Education – Discussion Paper*, MLA Implementation Team, Alberta

Training teachers to use computers is an important pillar of the Alberta government's implementation plan. The program, sponsored by the Telus Learning Connection, trains a select group of teachers. These teachers are then given time away from their teaching responsibilities to conduct inservice training and offer regular support for teachers within their district. The goal is that each teacher pass on their expertise to approximately ten more teachers. John Travers, chair of the school technology task group enthusiastically suggests that the project has generated a solid foundation from which to establish a new model of inservice for all types of technology.

At either end of the spectrum, teaching or learning, teachers in the school system currently are required to devote a considerable amount of energy to technology-related tasks. The official teacher trainers are given paid time outside the classroom to travel to other schools in their district in order to help other teachers get started. The trainers offer assistance in a number of ways. They may help set up software and hardware requirements, build a technology plan for another school, or help plan a technology-based class project. The official trainers usually have the added responsibility of acting as the expert in their schools, and like the informal teacher trainer they are called upon to support other teachers in their school. The untallied costs in this model can be found in the 250 classrooms where students have regular substitute teachers because their teacher is committed to helping others.

Training demands are not, nor should they be considered short-term requirements. The government has made some effort to ensure that all new graduates will have some

technology training. It also recognizes that technology changes rapidly and retraining is an ongoing necessity.³⁷ In contrast, teachers suggested that funding for all aspects of educational technology was diminishing. Teachers, therefore, are left with technology curriculum commitments but are not receiving funds to back up the demands.

3.1.3 Day to Day Slow Downs

The fact that not all teachers have a firm grasp of how technology works or how to fix it when it is not functioning properly, also affects the overall efficacy of the technology. Teachers I observed all made special concessions to compensate for limited computer access and malfunctioning machines. One teacher, for example, had his class split between four rooms as he tried to have them complete a social studies project. Students were divided between the regular classroom, two computer labs and the library. The teacher's main concern was that he was not able to offer enough support to each of the students. He also felt it was a detriment to students who needed more encouragement to complete their assignment.

I asked this teacher if more computers in the classroom would solve his problem. He suggested that more computers in the classroom, in particular, a computer on every student's desk, was not the answer. This teacher believed that 3-5 computers per classroom are beneficial but any more could not be physically accommodated. His key recommendation was to have teaching support. He suggested a full-time computer

³⁷ Training has been a consistent theme throughout the integration process. See: Discussion Paper, 1995, 5; Framework for Technology Integration, 1996, 8; Preparing to Implement Learner Outcomes in Technology, 1999, 27.

facilitator who would offer teaching support, in addition to taking on other responsibilities such as research assistance, inservice training, trouble shooting and technical repairs when necessary.

The importance of having someone responsible for trouble shooting and repairs was another issue raised by almost all the teachers. Of the teachers interviewed, most found that it was very common to “waste” class time trying to fix a technical problem. These problems included everything from an inability to access the local server to fiddling with the idiosyncrasies of the wordprocessor.

Teaching time was compromised because attention was taken away from helping students complete projects. Technical difficulties also impeded on the time teachers have to foster relationships with their students. During my visit to Ms Brown’s class, for example, she spent her preparation time before class calling the local school district trying to find out why the local server was down. This was time she normally spent greeting her students at the door. Ms. Brown found greeting students an important part of her day. The children in her grade one class would share special stories or events from the previous evening. The technical difficulties meant Ms. Brown missed out on her time to develop a special rapport with the students and also the time needed to settle the excited children.

Models for staff development suggest teachers can proceed through “the mastery stage” and be both comfortable with technology and able to enhance their instructional processes and achieve learner outcomes. Ms Brown, like many of the teachers I interviewed, is in the process of mastering technology but this does not preclude regular slow downs and technical difficulties that disrupt her class time.

Jean-Claude Couture's research in Alberta High schools uncovered similar concerns. He offers a quote from one of the teachers he interviewed.

"With the pressure to get student marks up on provincial exams, it is hard to justify spending several classes navigating on the Internet, especially when the system crashes or runs slowly because too many students are using the system. Now we can't get documents printed because it costs too much for printers! After ten years of teaching I got a phone in my classroom. Maybe that is how long it will take to sort out these problems. In the mean time I do what I can."³⁸

3.1.4 Station-based Learning

Almost all of the teachers I interviewed suggested that technology was having a positive impact on learning because teachers were being forced to shed old methods of teaching.³⁹ The thrust of this learning strategy is to shift the responsibility of knowledge acquisition from the teacher to the student. The learner is to be at the center of the learning process rather than "the traditional notion that "knowledge" is transferred from the teacher to student within the confines of the classroom" (Aspen Institute Report, 1995, 3).

Placing the student at the center of the learning process is validated through a strategy of station or resource-based learning. Students are encouraged to seek out their own answers to questions by making use of available resources. The most common approach in Alberta has been to split students into small project oriented groups, which rotated

³⁸ Couture, Jean-Claude "Teachers' Work: Living in the Culture of Insufficiency," Tech High: Globalization and the Future of Canadian Education, Ed. Marita Moll, Co-published by The Canadian Centre for Policy Alternatives, Ottawa and Nova Scotia: Fernwood Publishing, 1997, 159-60.

³⁹ The Aspen Institute Report outlines several methods for the deployment of technology in education. Recommendations included in the report for legitimating and implementing technology are extremely similar to those actually established in Alberta policy. *Creating a Learning Society: Initiatives for Education Technology. A Report of The Aspen Institute Forum on Communications and Society*, Amy Korzick Garmer and Charles M. Firestone Rapporteurs, The Aspen Institute, 1996. Hereafter referred to in

between resources.⁴⁰ The most desirable resource, of course, is focused on telecommunications and computer technology.

A proposed benefit is that teachers are enabled to “teach more efficiently” and allows for better interaction with students (Learning Outcomes in Technology, 1999, 15). This is in contrast with several of the responses from teachers I interviewed. These teachers found that their time was too divided between the students. In addition, the location of the technology often meant students were divided among rooms and not just into convenient groups.

Ms. Brown’s grade one class was an example where station-based instruction was successful. What is not obvious or assessable is the number of people involved in making it work. The myth that surrounds station-based learning is linked to the goal of efficiency. A perception has been created in the policy rhetoric that students can become independent learners. More importantly, there is a belief that the teacher’s role is somehow reduced as they shift from expert to facilitator. As a facilitator, with students split into small groups, teacher’s work is not reduced but rather altered or even increased. Preparation is required for simultaneous group projects. Teachers must spend more time previewing resources to ensure they are suitable for unsupervised students, and they spend considerable energy trying to provide personal attention to each of the groups.

Ms. Brown’s success was due in large part to support staff. Working in a very affluent

the text as (Aspen Institute Report, 1996).

⁴⁰ Referred to a constructivist instructional model, students are encouraged to pursue open-ended questions and work in small groups with the teacher acting a facilitator. Learner Outcomes in Technology, 1999, 13

neighbourhood, parents in her community have raised additional funds to ensure they have more computer technology available to their children. Ms. Brown was also very fortunate to have a teacher's aid plus a regular parent volunteer.

In discussions with two school principals, in what they termed as very high-needs schools, the reality is very different. In these communities language or economic barriers created very different relationships with parents. For example, rather than parents pushing to ensure high-tech changes, it was more common for the school to have to reach out to educate the parent.

This brings us back to the technical markers established for ensuring equality of access. John Travers agrees that disparities will continue to exist; however, he argues that the criteria of one computer per every five student combined with teacher training and curriculum incentives will go far to ensure that a minimum standard in use is achieved. The difficulty with this logic is that it ignores the non-technical support required to make use of computers in the classroom.

Any evaluation of technology implementation must include consideration of staff support in addition to technical criteria and student outcomes. Minimum technical standards do not ensure equality of access, and student learning is less likely to improve in schools where additional funding is not available, where parents are not actively participating in the classroom, and where cuts have reduced support staff.

3.2 *New Subjects: Technology, Information, and Media Awareness*

Teachers are responsible for obtaining and updating their technical skills, and in many cases they are expected to ensure technology is working correctly and must manage their classroom projects despite regular technical complications and slow downs. Teachers are also expected to incorporate technology skills into their existing curriculum. These skills include understanding the nature of the medium and its place in society; using the computer-based applications; and demonstrating the ability to assess, manipulate and present information or communication. These skills are expected to be taught within the context and timeframe allotted for existing subject areas such as language arts, mathematics and social studies.⁴¹

3.2.1 *Technical skills*

Curriculum designers argue that technology is a subject within a subject. The relevance in using a wordprocessor, database, or a search engine is only acquired when it is given the context of an inquiry or subject-specific project. While this is very practical in theory the technology curriculum does increase teaching demands and for the purpose of planning should be recognized as a separate subject.

Students are expected to demonstrate an understanding of how the technology works.

For example, under the curriculum goals of *Foundations, Operations, Knowledge and Concepts*, junior high students are expected: to explain the difference between analog and

⁴¹ *Information and Communication Technology, Kindergarten to Grade 12: An Interim Program of Studies*, Alberta Education, Curriculum Standards Branch, Alberta, June 1998, 2. See: Projects: <http://ednet.edc.gov.ab.ca/technology/> Hereafter referred to in the text as (Interim Program of Studies, June

digital communication systems (Interim Program of Study, 1998, F1, 3.6); explain the concept of software and hardware compatibility (F1, 3.2); and demonstrate a proficiency in uploading and downloading text, images, audio and video files. Students in elementary school are expected to demonstrate a certain level of proficiency about computer technology. By grade 3 students are expected to “perform basic computer operations (which may vary by environment) including powering up, inserting disks, moving the cursor, clicking on an icon, using pull-down menus, executing programs, saving files, retrieving files, printing, ejecting disks and powering down” (F6, 1.1). New technical skills also include everything from the ability to access and incorporate clip art to support communication by grade three to “creating multimedia presentations” (P3, 2.1) by grade six. In perspective, grade three students are expected to understand and use a computer keyboard at the same time master the alphabet and learn to write in paragraphs.

According to John Travers, these curriculum expectations are very meager. Many students will already have many of the technical skills before they even get to school. He also offers assurance that skill development is planned in very gradual stages. Regardless of the slow progressive approach, the technical skills represent a new addition to existing curriculum demands. Teachers, I interviewed suggested that they constantly struggled to work through existing curriculum and are finding it a challenge to incorporate technical skills and meet core curriculum requirements.

It may be important to integrate regular subject material with technology skills but for the sake of planning the two should be considered separate areas of study. Teacher’s

preparation time is intensified. Their ability to work through subject matter is often impeded because of technical difficulties, and lag-time. These technology-related problems, albeit common in my observations, are not guaranteed to have an impact on student learning. Yet, they do deflate the notion of technology-generated efficiencies promoted by the Alberta government. It is also evidence that teachers play the most critical role in ensuring the positive impact of technology.

3.2.2 Information Processing

Understanding how to use computers and computer applications is only one aspect of the new technology curriculum. Students are expected to use these skills to seek out information, process that information and present it according to the goals of the inquiry. From Kindergarten to grade nine, for example, students are expected to find and save information from an electronic source (C1, 1.1, 2.1, and 3.1). Students from grade four to nine are expected to analyze and synthesize the information and consider the different viewpoints on a particular topic. At the junior high school level students are expected to work from a broad range of electronic sources and demonstrate the ability to “refine searches to limit sources...” (C1, 3.2). Based on these curriculum goals the teacher must refine access to electronic sources appropriate to the level of instruction.

The hype of global communication via electronic sources raises issues of ethical use within the educational setting. Gathering information off the Internet raises similar concerns and contributes to the overall resource drain of the technology. Information is unfiltered, lacks categorization and is often unaccredited. Neil Anderson suggests that new and converging technologies have changed the landscape of the classroom. Prior to

computer networking technology information flows where highly controlled. Textbooks tended to represent a very generalized viewpoint and are subject to a purchasing/filtering process before being accepted into the classroom. Library materials met the criteria of the teachers, librarian and school community before being accepted into the school collection. Other media resources including radio, film and television went through the same filters as the book collection. Filters, of an educational nature, are almost non-existent with information available on-line. Controlling the type of information students' find on the Internet and World Wide Web offers new challenges for the school staff.

The teacher making use of the Internet, world wide web, and email must become somewhat expert in search techniques, and preparation includes searching, filtering and presenting both electronic and print resources.

The use of email, depending on the school policies, often means at the minimum supervised communications and possibly having the teacher act as the liaison. The teacher is also expected to establish the acceptable practices regarding use of the Internet and World Wide Web. The option with the least amount of ongoing concern is to mechanically filter out sites or topics that are deemed inappropriate. This is a formidable task at best since the World Wide Web is constantly growing and changing.

3.2.3 Media Awareness and Media Literacy

The alternative is to ensure supervision and include media awareness as a regular exercise. According to Anderson "[a] basic precept of media education, 'education not evasion' will help students make more genuine sense of the world. Media awareness is critical if students are given the opportunity to use new electronic tools. Computer

networking offers students the opportunity to encounter a much broader range of topic and content. They need time to address new topics and de-neutralize the text they encounter.⁴² Media awareness, therefore, is in itself a significant undertaking. Some aspects of media awareness have been included in the new curriculum requirements while some media-related issues have been left to the ingenuity of each individual teacher. The extent to which teachers are prepared to fully teach media literacy seems to vary from school to school. One of the greatest hurdles teachers must overcome is the lack of planning to support the teaching demands.

Media awareness and media literacy covers a broad range of topics. In general terms, media literacy experts agree it focuses on the critical review of information. "Media literacy is concerned with helping students develop an informed and critical understanding of the nature of mass media, the techniques used by them, and the impact of these techniques."⁴³ David Considine suggests that "[media literacy] moves from merely recognizing and comprehending information to higher order critical-thinking skills implicit in questioning, analyzing and evaluating that information."⁴⁴

A variety of techniques and criteria for media literacy have been identified. Each of the methods provides for a greater critique of information and will improve student learning. Information may represent a wide range of viewpoints and come in a wide variety of

⁴² Anderson, Neil (1998) "Media Education and the New and Converging Technologies" on Media Awareness Network Website — Future Take, www.media-awareness.ca/eng/med/class/andrerson.html

⁴³ Duncan, B. et al., *Media Literacy Guide*, Ontario Ministry of Education, Toronto, ON, Canada, 1989.

⁴⁴ Considine, D., *Telemidium: The Journal for Media Literacy*, Strategies for Media Literacy Inc. and the National Telemedia Council, Madison, WI. USA, Vol 41, No 2, 1994. Also found on Media Awareness Network Website. See: www.media-awareness.ca

genres such as cartoons, videos, stories, commentary, press releases or promotional announcements. Students should be able to recognize the techniques used to construct a message, determine who the message targets, who is behind the message and what viewpoint might be excluded from the message.

Neil Anderson, expands on these ideas in suggesting that teachers must address issues of authenticity, dissenting viewpoints, bias, cultural diversity and potentially contentious subject matter. He illustrates the new challenge that these topics raise for teachers in the classroom.

In the industrial age, the classroom was sanctified space, where texts and topics of study could be controlled for the protection of students and the comfort of the teacher. "World as Classroom" means that many contentious topics will now be fair game for study.

Middle Eastern politics, health issues, advertising, hate groups and family values will be part of the curriculum (Anderson, 1998).

Addressing the text, identifying the audience and understanding media production are three key aspects of deconstructing the media.⁴⁵ According to Richard Shepherd, students must learn how to evaluate all forms of text, whether they be images or print, to determine the meanings and values implicit in the text (Shepherd, 1993). Shepherd also believes it is important children learn to identify the target audience for the message. Examining the audience or receiver will also help students identify their relationship to

⁴⁵ Shepherd, R., "Elementary Media Education: The Perfect Curriculum", *English Quarterly*, vol. 25, nos.2-3. Canadian Council of Teachers of English and Language Arts. Toronto, Ontario, 1992. See: <http://www.media-awareness.ca/eng/med/bigpict/percurr.htm>.

the text. Students will have the skills to evaluate the intended context as well as the ability to choose whether the message is beneficial to their learning (Anderson, 1998).

In Alberta, educators are expected to teach students how to “critically assess information, manage inquiry, solve problems, use research techniques and communicate to a variety of audiences” (Interim Program of Studies, June 1998, 5). Of the teachers I interviewed, the most common criticism was that analyzing information makes up a very small part of the actual curriculum requirements. They were disappointed because the curriculum goals put too much emphasis on having students learn specific technical skills. The teachers felt technology would change rapidly and the curriculum goals would quickly be dated. The teachers recognized a need to spend more time evaluating media text.

The critical components of the technology curriculum require students, at a very early stage, to “demonstrate an understanding that the user manages and controls the outcomes of technology” (F1, 1.3). In grades four, five and six students are expected to consider how technology can create environmental concerns (F2, 2.3) and “describe... how communication and information networks, such as the telephone and the Internet, create a global community.” (F2, 2.5). The study of the nature and impact of technology is considerably intensified at the junior high level. Students must be able to “describe the impact of communication technologies on past present and future workplaces, lifestyles and the environments” (F2, 3.1). Junior high school students must also consider the impact of global communication on culture (F2, 3.3), “analyze and assess the impact on society of having limitless access to information and “how telecommunications

technology affects time and distance” (F2 3.8).

In grades seven, eight and nine students must demonstrate an understanding of the “nature of various media and how they are consciously used to influence an audience (F4, 3.2). Junior high school students are also expected to identify techniques used to elicit a specific audience response (F4, 3.3) and to recognize how messages can be altered by manipulating images and sounds (F4, 3.4). Between kindergarten and grade three students are asked to “compare similar types of information from two electronic sources” (F4, 1.1). From grade four to six students must “describe how the use of various texts and graphics can alter perceptions” (F4, 2.2). Students from grade four to six are also expected to learn how technology can be used to “manipulate intent through the use of sounds and images” (F4, 2.3). Students are also expected to learn how to evaluate the authority and reliability of the information source and recognize the different purpose intended for the information (C3).

The most common concern among teachers was that the media literacy areas became overshadowed by the new technical skills. They suggested that students were spending more time on presentation and less time addressing contentious topics, analyzing text, or questioning the roots of media messages. In 1985, this would have been considered focusing on the “minutiae” rather than the media message.

The new emphasis on technical skills also meant teaching time became even more divided. Students were required to learn how to use computer application, evaluate media messages, consider the overall impact of communication technology, and retain information about the core subject. Teachers felt that both the core curriculum and media

literacy demands were being jeopardized. It was suggested that the problem affected learning and teaching.

A principal at an Edmonton elementary/junior high school stated that “positive results from the Internet are only possible with good planning and preparation. The negative aspects of the Internet includes the time required to prepare and sift through information.” Many of the language arts and social studies projects that teachers were doing required finding relevant materials on the Internet or planning communications using email in addition to finding traditional sources. The teachers either bookmarked relevant sites or refined the students’ search by creating a webpage with links to a selection of important sources. Teachers such as Ms. Brown who use email to generate outside communication processed the email before it reached the students. Preparation time is a regular part of teacher’s work; however, there is little discussion within the technology discourse to acknowledge the new planning requirements. Planning is addressed in either technical terms or individualized as a problem for each teacher to rectify.

The discussion paper on technology integration in 1995 sets the tone for *Improving Teacher Preparation and Support*. Like the policy that followed, preparation and planning included recommendations for teachers to receive training on how to use computers; each teacher is given a computer and the necessary software; and teachers learn how to integrate technology into their regular curriculum. Technology planning does not address the concern that the new curriculum requirements create the equivalent of three subject areas – technical skills, media literacy and the core topic.

Planning concerns are exacerbated further by the fact that each individual teacher is

expected to carry the burden of meeting new curriculum demands. The problem of preparation has become individualized and internalized. The government suggests that teachers first learn how to accept change (Learner Outcomes in Technology, 1999, 3). Teachers are also expected to learn better time-management strategies in the process of mastering technology skills. This implies that planning and preparation concerns can be overcome if the teachers just gets better at technology, accept change and work more efficiently.

Time and technical requirements may pose some of the problem but generally the problem stems from an incomplete policy framework. In an attempt to present technological promise and improved efficiency, teaching has become compromised. Teachers that I interviewed were often far beyond the "mastery stage" of technology development and into the "Innovation stage." These teachers were very responsive to technology, had instigated new teaching techniques, assisted other teachers and had developed very exciting curriculum applications for technology. Yet, these teachers were also very concerned about the impact of the new technology requirements.

Computers and computer networks offer resources but these resources are unfiltered, unprocessed, vast and random. A teacher who uses technology such as the Internet, who is concerned about the messages his or her students are receiving and who wishes to meet their curriculum goals will always have extensive preparation requirements.

3.3 Chapter Conclusion

The technical trajectory highlights the drastic shift in priorities that occurred in the educational reform between the 1980s and the 1990s. In the library integration policy of

1985, information and resource-based learning was at the forefront. Technology was considered an important tool for acquiring information in this policy but the role of the linking these resources with the educational requirements a priority. The library integration model includes a section: *Resource Evaluation and Selection*. Under this heading it is states that “[l]earning resources are sources of information regardless of format. Careful evaluation and selection of these learning resources is necessary to meet student and curricular needs. The abilities, interests and maturity levels of students should be considered and the materials selected should support and enrich the curriculum” (Focus on Learning, 1985, 15). The policy goes further by outlining both how the teacher-librarian and teachers should go about evaluating and collecting resources and that these planning requirements must be included in the overall plan for library integration.

The library integration policy stands in stark contrast to the technology integration policy. The former focuses on the importance of enhancing the human infrastructure, the latter places a greater priority on generating efficiencies through an electronic infrastructure. One principal expressed concern that what lacked in the new technology initiatives was an implementation plan. What he was saying was that despite the elaborate plans to put technology into the school there were no provisions to account for the actual application of “technology as a time intensive discipline” and the educational requirements.

In addition to using machines and finding information, the new technology curriculum requires that students think critically about both the techniques they are using and the information they are discovering. In 1985, the teacher-library was to be a key resource

for teachers dealing with new technology-related demands. The responsibilities were divided up between the librarian and the teacher as well as other resources both inside and outside the school. The 1995 policy offers a technical network and leaves each teacher to his or her own initiative. It is presumed the teacher will find the time, means and resources required to ensure that every student fulfils the established curriculum goals. The curriculum design is to blend the use of computer technology into existing subject areas. A social studies project on Chinese rulers may include discussion of the impact of the research medium, to assess to whom, and where the information is coming from and the nature of the text. The desire to blend subject and technology masks the increased demands on teachers and teaching resources.

These are contradictions that arise within the technology integration discourse. Combined with technology is a new language of efficiency and promise to improve teaching and learning. Lost within the hype is the various ways teachers have been affected. "More and more of us are working harder and faster trying to keep up with all our labour-saving, timesaving technological aids we're buying into and using" warns Heather Menzies (1997, 5). The inability to see how technology and the agenda that surrounds it affects teachers makes it that much more difficult to understand the role technology is having on learning.

4 Teachers Lose Valuable Support: The Teacher-Librarian*

This chapter offers further study of Alberta Education's goals for information management and media awareness in relation to new expectations for teachers. It focuses on the role of the librarian, or lack thereof, as critical support for the increasing demands on teaching and learning. A junior-high school in Alberta is highlighted for its enthusiastic integration of technology and the curriculum. This school's success, mentioned in the introduction, stems from collaboration among staff within the school. It has an open approach to student use of technology, and the teacher-librarian provides considerable support. The model this school offers is contrasted against the efficiency rhetoric of the technology integration policy – a narrative that excludes the role of the teacher-librarian. The lack of planning and foresight for teaching support is made worse through the elimination of the teacher-librarian. I will argue that it is the professional competencies of a teacher-librarian that are invaluable to any high-tech school environment.

4.1 *John Ware*

On its website, John Ware Junior High School is characterized as being a pioneer in computer networking. This school was the exception in regards to its devotion to computer technology. "In Calgary, we were the...first to have a HomePage; first with Internet access from all the computers on our network; first with Internet E-mail for all

* Although this chapter focuses on teacher-librarians, the reader should see their role as a metaphor for all the support measures that have been compromised or lost between 1984 and 1994.

our students; first with a HomePage for all our students...and that was all in 1994!”⁴⁶ An enthusiastic teacher in this school had started computer-related activities in the early 1980s and had a primitive computer network for students much early than 1994.

I arrived at the Calgary school at 7:45 on a Tuesday morning. It was fifteen minutes before class started for the day. My initial contact was the typing and computer literacy teacher. He showed me around the school, introduced me to some of the students, teacher-librarian, principal and several other staff members. The first stop on the tour was his classroom which was also one of two computer labs for the school. Several students were in the classroom checking their email before going to their morning classes.

The second stop was the library. It housed the second computer lab in the school. The library was designed as the central space that branched out into individual classrooms. The philosophy concerning the physical design of the library seemed relevant because it carried into the pedagogical style within the school and embodied certain values. In the classrooms, students had individual subject spaces and interactions with teachers but at the same time there was a strong common space to interact with other students. Teachers treated the library as an extension of their class space. The library did not have official booking times but rather teachers used it for activities that required more space or as a station for group learning. Teachers also made use of the library for research purposes. The central hall plan seemed to facilitate/encourage a regular, if not subconscious, use of

⁴⁶ Homepage for John Ware Junior High School, Calgary, Alberta. See: <http://www.tcel.com/~pstobo/johnware.html>

the resources in the library. A center plan library is like a pinwheel with each of the spokes or classrooms representing spaces for specialized subject areas and the center of the wheel acting as the hub for resources, interaction, collaboration, and learning.

The teacher-librarian played an important role in optimizing the benefits of a center hall plan.* She often knew the students and their personal interests; she facilitated the flexible use of space and resources; and she had a strong grasp of the teacher's needs. Both students and teachers came for help with their research since she had a broad knowledge of resources in a variety of mediums. She also developed and maintained an extensive library webpage with relevant resource links.

During my visit the librarian helped one teacher coordinate resources for a health module. The librarian was aware of a program created by a teacher in a previous term. The program required students to work through a set of relevant problems. The teacher and librarian also coordinated books, a CD-ROM, and marked a relevant Internet site to help the students work through the health questions. The teacher was able to start the health module that same day. The impromptu collaboration, although not the norm, was largely made possible because of the knowledge, expertise and support of the teacher-librarian.

The computer lab run by the teacher librarian was very accessible. Unlike most other schools I visited, the library was open to students during non-class times. In many of the schools I visited it was common to see a computer lab situated close to the library;

* I encountered several center hall libraries, some which also included a computer lab but lacked a teacher-librarian. While the workspace was convenient for the teachers they were missing the functionality that came from the librarian's support.

however, many libraries lacked a teacher-librarian or the equivalent. And in many of the cases the physical proximity to the library was the extent of the lab connection. It was more common to see an individual teacher or technician responsible for the lab. The downside to not having a teacher-librarian meant that teachers did not get help in the area of information skills or resource management, and this implies that no one is responsible for the bigger picture — keeping track of past, present and future initiatives within the school as a whole. Student access to the lab was also limited because, unlike a library-centered facility, a lab did not have the same flexibility in supervision and scheduling. In some cases students were making a special request to use the computers but the teacher had to agree to stay and supervise.

At John Ware the librarian was available on a regular basis to help students and the teachers. There was a personal, structural and historical grounding for the open, collaborative environment in which students could develop information and technology-based skills. The teachers played the primary role in teaching traditional subjects and new technology-based skills. The librarian's role was to support the teachers. She compiled resources, encouraged personal interest and fostered a collaborative environment. In this school the teacher-librarian also took on the primary role of teaching information skills, including how to evaluate the credibility of a source and decode the messages available. John Ware's successful integration of new technology was based on the history of resource sharing facilitated by the librarian and strongly supported by the collaborative efforts between all of the staff.

4.2 *Excommunication of the Teacher-Librarian in the High-Tech Discourse*

4.2.1 *The Teacher-Librarian, high priced help or highly valued resource*

John Ware seemed to be more of an exception than the rule when it came to the strong role of the teacher-librarian in supporting the technology integration plan. Unfortunately, the pattern I encountered is part of a larger trend that minimizes the role of the library and has put the teacher-librarian on the endangered-species list.

Concerns about the role of the teacher-librarian in a high-tech school environment have been looming for several years. "Almost every school in the country has a space referred to as 'the library' or 'the resource centre', but their educational role has withered as other priorities push aside the perception that students need school libraries."⁴⁷ This was the warning in 1997 at a National Symposium on Information, Literacy and the School Library in Canada. The symposium was assembled to find ways of ensuring a place for libraries in a climate of technological enthusiasm and "...new calls to reduce the overall cost of schooling" (Forging Forward, 1997, 1).

A link between cost efficiency goals and the demise of the teacher librarian is particularly evident in Alberta Education's technology policy. The evidence is not explicit but rather sins of omission within the policy dialogue. Machines are expected to reduce labour expenditures and generate efficiencies in the system. The student is expected to become

⁴⁷ "Summary Statement," *Forging Forward: National Symposium on Information, Literacy and the School Library in Canada*, Association for Teacher-Librarianship in Canada (ATLC) and the Canadian School Library Association (CSLA) in association with ASTED (Association pour l'avancement des sciences et des techniques de la documentation) Ottawa, November 19-22, 1997, See: www.geocities.com/Athens/Olympus/1333/summary.htm Hereafter referred to in the text as (Forging

an independent learner with the aid of machines and some guidance from a teacher.

Teachers work is downplayed and the provisions for supporting teachers centers on technical possibilities. Resources available through the library and the teacher-librarian are not part of the policy discourse. As significantly, the role of information management and media awareness is discussed simply as student outcomes rather than a demand on resources (especially human ones).

Who is responsible for the new information challenges introduced by new technologies?

This question was posed at the National Symposium on Information, Literacy and the School Library in Canada.

‘The Internet and the Web can replace the old library in the school. The Internet can replace those boring books and stuffy ideas and costly specialists with lively, colorful, interactive action through the ether.’ Just who will bring the wealth of information into play in the curriculum? Who will teach children propaganda from truth? Who will choose the best quality resources for use by our students and teachers? Who will help students and teachers connect information technologies with the skills associated with information literacy? (Forging Forward, 1997, 1)

The questions raised at the National Symposium are similar to the library integration policy. The emphasis in the early 1980s policy is on information as the major cause of new societal changes (including technological changes), and addresses the questions of who is needed to teach the necessary information skills. Information and the demands it presents are lost within the new technology integration policy. Teaching and learning machine-based techniques such as how to use a search engine paint program and word processor has overshadowed the message-related demands.

In 1984 the process of teaching and the support network for developing new skills was the primary focus. "...Life long learning [is an] attribute that can be nurtured through a stimulating integrated library program" (Focus on Learning, 1985, 4). "Students are also encouraged to employ a variety of learning strategies and to develop the creative approaches that are most natural to them" (Focus on Learning, 1985, 3). Words such as "encouraged" and "nurtured" are common throughout Library Integration Policy. It offers a discourse in which teaching is essential to skill development.

Instruction is listed as the first of three important components in the model for library integration. Student outcomes are identified within the instructional component. The curriculum goals are considered important in terms of assessing successful policy implementation but at the same time are used to highlight the resource demands.

"Meeting these goals is a formidable task which demands that teachers look beyond the classroom and the text book. All of the material and human resources of the school library must be put to work to develop "information literate" students..." (Focus on Learning, 1985, 8).

Within the 1990s discourse, the act of encouraging students is buried in a language of technological determinism. "Technology is most importantly about thinking.... It [technology] provides us with techniques and process to think differently..." (Interim Program of Studies, June 1998, 1).

The Alberta government asked school boards across the province to develop "three-year

technology plans for the integration of technology in education.”⁴⁸ Alberta Education prepared a template or model to ensure elements of the plan were consistent in every board. Elements follow the pattern of establishing technical criteria. Costing of hardware and software is included. Access to computers is addressed in terms of planning computer to student ratio and inservice opportunities, and the availability of technical support. Under the heading of staff support, for example, it is suggested boards “consider providing all staff with appropriate hardware and software tools to effectively perform their responsibilities...” (HSBP, 1997,5). The technology framework is limited. It only addresses staff in relation to technical requirements.

Student learning and instruction is considered an element in the plan. The first component that is suggested is a general statement about what technology can do for teaching and learning. The remainder suggests listing areas of the curriculum teachers should focus on, how to evaluate the new skills and where to situate the computers in the school.

In one specific school board plan, there is mention of the school library. The goal is to automate the school library with network capabilities.⁴⁹ Money is budgeted for each school in the district to have one computer, with CD-ROM and Internet access. These computers are to be networked within the district to be accessible in the classrooms and other schools in the district (Lethbridge technology integration plan). Library automation

⁴⁸ Handbook for School Board Technology Planning, February 1997-Draft, Alberta Education Website. See: <http://ednet.edc.gov.ab.ca/technology/>

⁴⁹ Lethbridge School District No. 52, Technology Integration Plan and Recommendations. See: Best Practices <http://ednet.edc.gov.ab.ca/technology/>

is listed under the heading of “MLA Recommended Direction... Management of Information and Business Functions of the Education System are More Efficient.” The only mention of library staff is to suggest that provisions have not been made to help the existing staff (the librarian or equivalent) convert the collection to an automated system. There is recognition that information available in the library is important for teaching and learning but efficiency in the automation becomes the focus rather than the human support network.

The technology-planning guide and subsequent applications is evidence of the new trends in the Alberta education system. In the desire to pursue computer-generated efficiencies, there is neither the funds nor the appeal to have teacher-librarians play a role in meeting new teaching demands. Couture uses the words of J. Kerr to suggest that this “logic of technological rationalism has emerged in the culture of teacher’s work.” (1997, 154). He is referring to a discursive current generated in education technology rhetoric that makes certain budgeting decisions acceptable while excluding others. Support for teachers, for example, is based on having computers available with the opportunity to have them repaired when needed. This rhetoric stands in stark contrast to human resource concerns that were prominent in the 1984 library integration policy.

4.2.2 Partners in Education: The Exclusion of the Librarian

In the library integration policy “improved opportunities for student achievement” is the responsibility of the principal, teacher-librarian and the teachers.⁵⁰ It is expected that this

⁵⁰ Focus on Learning: An Integrated Program Model for Alberta School Libraries, Alberta Education,

critical partnership work in accordance with policies set out by the Alberta Education and the local school board. The role of the teacher-librarian and the principal is to support the teacher and provide instructional leadership in the teaching of information skills.

By 1995, the discourse of electronic communication focuses on the global rather than the local. Global suggests geographic properties and also an external networking emphasis — that is a network outside the walls of the school. Administrators, clerical staff, teachers, and students are encouraged to build connections with other schools or outside the school. Global connections are a key attraction of the new telecommunications technology. Direct links between the district office and the schools can reduce duplication, storage requirements, and the assessment process. Teachers are expected to build connections with other teachers or subject experts in order to expand their resource opportunities. Students are expected to have the opportunity to communicate more easily and quickly with a range of new contacts.

There is considerable appeal in making external connections. Unfortunately, while attention is on cost and technical requirements for an electronic network, little attention is directed at the day to day time and resource requirements for sustaining global connections. Internal support networks within the school are also neglected and de-emphasized.

It may be assumed that staff within the schools will continue to communicate as a matter of necessity, but support staff such as the teacher-librarian have been systematically

excluded from the discourse of technological integration and global communication. The trend makes external links more attractive or a matter of necessity. The teacher, for example, is given sole responsibility for teaching information and communication studies and accessing student skills. The school board, Alberta Education, and community and business partners are expected to aid in setting technical standards and support teacher training, but it is the responsibility of the teacher to find to create a network of resources (preferably a global network).*

The Alberta Education website includes a fact sheet on *Partners in Education* as part of series on "Our students future." The list of partners reinforces the pattern established in the technology integration policy. Students, teachers, principals, parents, councils, community and business, boards, superintendents, and Alberta Education are all listed as partners. There is no mention of the teacher-librarian.

Partnerships created for the development of curriculum outcomes offers more evidence of the exclusion of teacher-librarians. There were 16 teachers as part of the writing team who had "experience in *classroom* use of technology" and 11 other individuals on an advisory committee who helped to develop the outcomes.⁵¹ In both the writing and advisory capacities, teacher-librarian's were not mentioned. The committee members, for

Learning, 1985).

* In 1995, the role of the teacher-librarian and in-school support network is significantly compromised. The business community is the most prominent education partner forged in the policy on technology integration. One of the earliest considerations in the technology integration plan was to address the role of private industry. This role included assistance in matching technology-related skills to work opportunities, fostering work-experience placements, and acquiring financial support for technology integration.

⁵¹ Alberta Defines Technology Learning Expectations, November 7, 1997, Alberta Education Website. Hereafter to be referred to in the text as (Learning Expectations, Nov. 7, 1997).

example, represented such groups as the Alberta Teachers' Association, the Alberta Chamber of Resources, and the Alberta Chamber of Commerce (Learning Expectations, Nov. 7, 1997).

4.3 Supporting the teachers: the Librarian's Place

As we have seen, the trend is to diminish the role of the teacher-librarian, specifically in the area of teaching support. John Ware School, on the other hand; is an example of success generated because of a fully integrated role for the librarian.

The role of technology must be expanded beyond technical access and student outcomes. Demands on teachers will influence the successful integration of technology and the impact of technology in general. Taking into account the new demands on teaching – the technical, personal, informational, communicational, and instructional requirements – the role of the librarian should be reinstated into the policy agenda.

The following section reiterates the elements of the 1984 library integration policy in combination with the successful example from John Ware in an attempt to void the myth of efficiency and restate the necessity of the teacher-librarian.

4.3.1 Fostering Personal Interest

The library and the teacher-librarian could play an important role in fostering student interest in both learning in general as well as in using information and communication technology. The library offers a communal location and the librarian can encourage interpersonal relationships that will help develop the students self esteem, self-awareness and an interest in learning (Menzies, 1997, 5 or Focus on Learning, 1985, 3).

Students benefit when they are encouraged to pursue questions through a variety of sources. Their pursuit of knowledge is further fostered when some of the frustration of information overload is eliminated. Students benefit when there is a relationship between themselves and the teacher-librarian. The teacher-librarian is sensitive to the interests of the student body as a whole and has the opportunity to understand specific student needs. The teacher-librarian can often understand the social, emotional and intellectual needs of the students. For example, the teacher librarian knows something about child and adolescent growth and development for the age levels of the school (Competencies for teacher-librarians, 1997, 3).

The relationship between the student and librarian is one that develops when a library is open to students pursuing not just their academic responsibilities but also their personal interests. In the case of John Ware Junior High School, the teacher librarian made the library resources available to students during the lunch hour.* During library hours students were free to sit as a group and study, find books, or use the computer.

Computers were perhaps the most popular attraction in the library. After signing in, students could access their email accounts, use CD-ROMS, or pursue other interests such as creating their own software games.* One grade nine student I interviewed was using his free time to search the Web for anything related to soccer and skateboarding. The

* At John Ware the library was not open to students during the whole day but students did have an opportunity to use the library during certain non-class hours.

* The computer teacher hadn't taught that years students to program the game but some of the older students had passed it down to the younger students. When I visited the school there were five out of the 13 students playing the game. It is also interesting to note that preprogrammed games such as solitaire and Tetris were not allowed on the school computers.

pictures, articles and statistics that he found might not be academic in nature but several benefits come from a library open for students to pursue personal interests. For instance, students are meeting in a common space and finding other students with similar interests. The teacher-librarian gained a better understanding of students' interests and was available to talk to or help the students. It fosters not only personal interests but also a sense of a local community and personal relations.

4.3.2 *Appreciation of Culture*

The technology discourse differs from the library discourse in that it excludes a discussion of local cultures and personal relationships in favor of promoting global information flows. "Students and teachers are no longer limited to the contents of a single textbook or to what is available in local libraries. The total store house of human knowledge is becoming accessible electronically and the Internet makes it available anywhere, anytime."⁵² Local communities – within the school – are affected by the technology integration policy in several ways. The local community is seen as limiting or restrictive. This example suggests that electronic opportunities far exceed what can possibly be generated within a local community.

Money was set aside by the government to establish the infrastructure for "a learning network" to "improve communication and information exchange throughout the entire education community."⁵³ Teachers will be able to seek new curriculum activities, and to

⁵² *Technology Integration in Education – Discussion Paper*, by MLA Implementation Team, Alberta Education, Alberta, July 12, 1995, 1.

⁵³ *Implementation Plan for Technology in Education* (Brochure or webarticle), Alberta Education, Alberta,

communicate student outcomes directly to the district office. Electronic networks offer exciting possibilities in education, but at the same time detract from a discussion of local school cultures – so important in facilitating communication between staff and students within the school. Global opportunities facilitated through technology seem to preclude a discussion of local communities. Heather Menzies warns “as technology use and consumption becomes a bigger and bigger component of ‘work’ these days... the bias will be towards dis-engaging students from grounded communities of learning centered in personal relationships, and re-engaging them in cyberspace – ‘virtual’ communities of learning where technology mediates learning, not a local teacher-librarian who knows those students in their local diversity.”⁵⁴

In the library integration program of 1985, the emphasis was on using the teacher-librarian as a key intermediary in encouraging a strong local culture. The teacher-librarian was expected to facilitate communication among teachers and the administration. Their role was also to support students by creating a familiar place for learning and by helping them situate resources within the context of their own personal interests. A quote included in the Focus on Learning document suggests the important connection between the library and the cultural environment within the school.

“What better place to assist students and teachers to understand differences, what better place to have students exposed to a variety of

November 1996, 2. See: *Planning* at <http://ednet.edc.gov.ab.ca/technology/>. Hereafter referred to in the text as (IPTE, November 1996).

⁵⁴ Menzies, H. “Teacher Librarians and the Crisis of Public Culture ‘Forging Ahead by Forging Social Bonds,’” presented at the conference on *Forging Forward: National Symposium on Information, Literacy and the School Library in Canada*, National Library of Canada, November 1997, 2. See: <http://gateway2.uvic.ca/symposium/menzies.html>

points of view, what better place to ensure the dignity of all individuals is reflected than in the school library.” Calgary Board of Education Teacher-Librarians, as quoted in **Committee on Tolerance and Understanding Final Report**, p95.

The library integration policy made an effort to incorporate the local as well as the global. The model included networking as an important component of the library services. “The library does not operate in isolation.... Resource sharing networks stretch from local to national levels and the sharing agreements that bind them together may be formal or informal” (Focus on Learning, 1985, 21). Even in 1985, computers were considered to play an important role in resource sharing.

4.3.3 Resource evaluation and selection

The technology integration policy suggests that students play a primary role in finding information and selecting resources. The preferable medium is an electronic or high-tech source. The discourse suggests teachers facilitate, as students become independent learners. Library resources receive scarce mention.

Although not directly included in the policy framework, educators, in their classroom and through virtual communities have had to take on the role of gatekeepers. For the sake of time restrictions, convenience, and ethics, teachers must assume full responsibility for the information students encounter. Educators must be apprised of new learning resources, filter out information deemed inappropriate, minimize the overwhelming possibilities available through sources such as the World, Wide, Web, and adopt material to meet “instructional or personal needs” (Focus on Learning, 1985, 15).

At John Ware Junior High School the teacher-librarian was able to save teachers time.

She stayed current on resources available through CD-ROM and the Internet. She also made an effort to communicate with teachers and find out what their teaching plans were for the year. This did not completely eliminate the teacher's preparation time but did speed up the process. It also encouraged more reluctant teachers to make use of electronic sources.

Evaluation of resource material is another area in which the teacher-librarian played an important role. On the school website the teacher-librarian compiled a general list of electronic resources. She researched relevant databases such as those provided by the public library. These resources were then readily accessible via electronic means as part of local library resources. Her efforts expanded the library collection, kept the collection current, and supported specific research needs within the school.

4.3.4 Media Awareness

Standardizing how to address media messages is part of being prepared to deal with media awareness. It is recommended in the technology integration policy that messages be evaluated within the context of a specific subject. At John Ware the Teacher-librarian offered a teaching unit on general critical thinking skills. She taught students to consider authorship, viewpoints, and bias within information from a range of media. She encouraged students to compare information from different sources and to verify information from unaccredited sources.

The teachers were responsible for fulfilling other media curriculum goals such as how technology affects society, environment, and culture. The extent to which teachers and students deconstructed text, evaluated layers of meaning, and considered multiple

perspectives was not evident from my observations. The teacher-librarian and other teaching staff did, however, strive to provide an open environment for the students. Students were not overly restricted in their efforts to explore new information resources. Both the teacher and librarian, were available if students had questions about material they encountered. The teacher-librarian also offered supervision during non-class times and dedicated considerable preparation time to anticipating the academic and personal media needs of the students.

The role of the teacher-librarian at John Ware closely resembled the model established in 1984. The teacher-librarian was considered the expert in managing information resources. The librarian purchased appropriate books for the library, incorporated community resources such as pamphlets and was expected to coordinate the schools media needs. The library integration policy also made significant plans to organize the use of computer-related technologies. More importantly, the policy suggested that the teacher-librarian must work along side the teacher to teach the necessary "information skills."

4.4 Chapter Conclusion

Although this chapter focuses on teacher-librarians, they are a metaphor for all the help teachers need to carry out their daily tasks. An excessive reliance on technology in the 1994 policy strips teachers of many valuable support functions. These functions are now performed by the teacher in addition to their ongoing work or are lost. With this loss the real losers are the students and the education system in general.

5 Conclusion

5.1 *Technological Modesty*

According to many, technology in education offers grand potential. Students can achieve “high level thinking skills,” teachers will be provided with new resource opportunities and administrators will benefit from better collaborative opportunities. The promise of improvement is impeded, however, as the effort to integrate technology is linked with cost saving and efficiency rhetoric. A realistic evaluation of the impact of technology stems from “having a sense of the whole” and “not claiming or obtruding more than a particular function warrants.” As Neil Postman suggests, this important starting point is technological modesty.⁵⁵

5.1.1 *Having a sense of the whole*

In evaluating Alberta’s technology integration initiative there is a political agenda and a provincial budget that must be appreciated in order to realize the full extent of the undertaking. The end point includes improving efficiency and effectiveness in the public sector. The Alberta government is working hard to see that schools provide attractive learning results at the lowest cost.

The technology policy is as much about putting equipment in the schools as it is about reducing budgets, finding new funding partners, reducing duplication and cutting out waste. Waste reduction, however, can amount to cutting corners, and taking people away

⁵⁵ Postman, N. *Technopoly*. Toronto: Random House, 1992, 119.

from where they are needed

Private sector support was solicited to collaborate, provide expertise, and fund new initiatives. These partnerships reflect a new dimension in education management and provide new incentives and techniques in education planning such as downsizing, entrepreneur-ship and performance indicators (Arnold, 1996, 230). The logic of economic prosperity becomes equivalent to improved student learning.

In keeping with the private sector ethos, the Alberta government is using technology integration as a tool to reduce duplication and cut waste. Databases of student records are being created to eliminate steps in the evaluation process. Software licensing is coordinated by the district or by the ministry to ensure the best cost.

5.1.2 Not Claiming and Obtruding More Than a Particular Function Warrants

The government's exciting prospects for technology far exceed what the machines and the "functionality of machines" is capable of providing. The obtrusion of technology starts with a dialogue of technological determinism that shifts the emphasis from people to machines. In ignoring or avoiding personnel planning and expenditures, efficiencies and cost-savings almost appear as tangible goals. The fact, however, is that machines and electronic networks do not, in and of themselves, warrant such promise. Technology is only as effective as the people using it.

Deterministic statements about technology suggest both that technology creates change and progress. The reality is that technology may play a part in reform, but it is the motivations and decisions of people who create change. The government's motivation

for cost efficiency, competitiveness, and provincial prosperity is as much, if not more of a factor in reform than the invention of the personal computer or fiberoptic cabling.

Technological determinism has however played a key factor in shaping the direction of reform. It has helped to legitimize expenditures for technical equipment and support and focused policy on these technical solutions. Personnel needs have been almost exclusively avoided through the policy framework. Ronald Ragsdale argues that “the determination of needs is usually subjective, and the entire process of assessing and meeting needs is heavily influenced by values.”⁵⁶ Subjectivity and values are not components of a machine they are determined by people and in this case at the expense of people.

Teachers have been assigned the prime responsibility for meeting technology outcomes. “Teachers will have an opportunity to diagnose the needs of their students and to prepare appropriate learning activities. Also, over the next two years Alberta Education intends to identify and authorize technology learning resources to help teachers implement the program of studies.”⁵⁷ Teaching responsibilities become individualized in the policy dialogue. The teacher will have access to “authorized...learning resources,” and can “prepare appropriate resources.” Collaborative opportunities provided by an electronic network is another area in which each teacher can find resources, and improve learning.

⁵⁶ Ragsdale, R. G. “Teacher Development: The Implications of Using Computers in Education,” *Canadian Journal of Education*, Vol. 14, No. 4, 1989, 448.

⁵⁷ *Information and Communication Technology, Kindergarten to Grade 12: An Interim Program of Studies*, Alberta Education, Curriculum Standards Branch, Alberta, June 1998, 3. See: Projects: <http://ednet.edc.gov.ab.ca/technology/> Hereafter referred to in the text as (Interim Program of Studies, June 1998).

Support for teachers is based on the individual teacher's initiative and ability to make use of machine and network efficiencies. Collaboration with in-school support staff such as the teacher-librarian is not discussed.

Individualizing the teaching responsibilities also comes through the logic ensured in the technology outcomes. Technology skills are defined as "curriculum within curriculum" which means there are new skills to be learned within the context provided by existing subjects. "The context of the subject matter provides definition or clarification of the technology outcomes" (Interim Program of Studies, June 1998, 4). Teachers are accountable for the core subjects and therefore should be responsible for bridging the two sets of curriculum.

Planning for educational needs is restricted as technical components of the new curriculum are awarded greater attention than the information requirements. Curriculum goals such as "creat[ing] visual images by using such tools as paint and draw programs for particular audiences and purpose" outnumber goals to critically assess media messages (Interim Program of Studies, June 1998, 19). In the 1984 policy this has been referred to as getting caught up in the *minutiae* of the media as opposed to focusing on understanding and evaluating media messages. Couture raises a similar concern when he suggests "we must resist the temptation to let information technologies make *informating* our goal."⁵⁸

⁵⁸ Couture, JC, "Teachers' Work: Living in the Culture of Insufficiency," Tech High: Globalization and the Future of Canadian Education, Ed. Marita Moll, Co-published by The Canadian Centre for Policy Alternatives, Ottawa and Nova Scotia: Fernwood Publishing, 1997, 161.

Prioritizing the minutiae of informing over information management has limited the possibilities for teaching support. Support for teachers' focuses on providing inservice training to ensure they are prepared to teach technical skills. Emphasis is also placed on supporting and maintaining of the computers and computer network so students will have access to new computer applications such as paint programs, spreadsheets and desktop publishing equipment. Planning for information management is left to the ingenuity of each teacher. Teachers are responsible for their new role as information gatekeeper. They are required to sort through unfiltered information, monitor email, and repackage information.

The internalization of staff development also limits discussions about how teachers should be supported in this period of technological change. In the relatively few efforts the government has made to recognize new demands on teaching, the focus has been on personal staff development. In this approach teachers are encouraged to improve their technical skills and become more accepting of the changing classroom environment. The dialogue of change implies that it is happening to teachers and not because of them. It suggests teachers must make more of an effort to improve their working habits. One of the key suggestions is that once teachers become more comfortable with technology and learn how to manage time and resources they will be able to effectively integrate technology.

The concept of staff development works hand in hand with goals for improving efficiency in education. If the problem of support is addressed in terms of individual teaching responsibilities than discussion about other support staff can be avoided. The reality

within the classroom offers a different picture. Teachers who are very comfortable with technology still feel overwhelmed by the new teaching responsibilities. Teachers are taking on a number of new jobs including technical and curriculum demands. They have been encouraged to provide technical support, teach other teachers, and cope with regular technical complications. In addition teachers are responsible for teaching technical skills and applying information management techniques.

Technology-generated efficiencies are simply a myth created through a limited dialogue on the promise of technology in education. As discussion of teachers' work is minimized and support staff is reduced to technical services the myth will continue to survive.

This paper re-advocates the position of technological modesty: that is, to understand the motivations, realities and limitations of Alberta's technology integration policy. The motivation to reduce public expenditures has been riding the coat tails of technological promise and attempting to replace the value of people with the value of machines. In practice technology introduces as many complications as solutions. Teacher's work has increased and valuable support staff has been ignored and undermined. The teacher-librarian in particular has been "excommunicated" almost to the point of extinction. This paper calls for a reassessment of needs that would include both the realities of technical and staffing demands.

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6.2 Related Websites:

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From Now On: The Educational Technology Journal, <http://www.fno.org/>

2Learn Home Page, <http://www.2learn.ca/mapset/mapset.html>

Media Awareness Network, <http://www.media-awareness.ca/>

The Alliance, Telus Learning Connection: The Partners,
<http://www.2learn.ca/mapset/about/alliance.html>

A FRAMEWORK FOR TE

A FUTURE PERSPECTIVE

- This framework represents a possible future perspective of technology integration as it might influence education. It represents areas that are at the foundation of our education system and should be considered in the broader context of change
- Are these perspectives appropriate in considering a new vision for technology integration in the province?
- Are there areas that we have overlooked or under-emphasized?
- Should we be concentrating more on some aspects and less on others?

PLANNING AND COORDINATION

- mechanisms are in place to assist in overall provincial planning for technology improvement and integration
- duplication of programs and services is reduced
- common standards and protocols are set
- learners can aggregate learning taken from accredited sources worldwide, and present profiles of their competencies to Alberta institutions for admission, advance standing and certification
- accreditation centres are registered with provincial authorities, or employers to certify learner qualifications
- technological capabilities of schools are improved as a result of provincial and school board coordination and planning

PARTNERSHIPS

- schools, business, and the community are partners in technology integration
- schools and students assist the community and business through technology programs and services
- costs associated with technology integration in schools are reduced through partnerships with the community and business
- business resources provide turn-key solutions to assist in technology implementation
- community and business partnerships extend access to computers and programs during and after school hours

TEACHER PREPARATION

- teacher preservice is adjusted to include technology in instruction
- on-line tutoring and computer-mediated learning are used regularly by teachers to update and enhance their competencies and skills
- the teacher role shifts to instructional design and facilitation

IMPROVING STUDENT LEARNING

- learners are at the centre of education planning
- learners take ownership of their own learning
- technology learning systems are used to meet specific learning needs
- learners at all levels interact with teachers and peers
- some learners take advanced level courses to meet requirements
- learners complete courses at their own pace using systems and courseware
- using technology, learners collaborate with peers
- parts of the school program are taken as distance/open learning
- all Albertans are independent lifelong learners

INFRASTRUCTURE

- learners have ready access to a provincial or SchoolNet services
- learners and teachers are able to interact through bulletin board services in all Alberta schools
- high demand courses at the high school and university levels are available through the Internet
- video-on-demand is available to learners through a network
- flexible scheduling improves access to courses
- students collaborate with peers from other schools

WORK FOR TECHNOLOGY INTEGRATION

TEACHER PREPARATION AND SUPPORT

• preservice is adjusted to include competencies using technology in instruction
• one-to-one tutoring and computer-mediated learning resources are used
• teachers are encouraged to update and improve their teaching skills
• teacher certification and employment includes demonstrated technology competencies and skills
• teacher role shifts to instruction planner and coach-facilitator

CURRICULUM AND ASSESSMENT

- learner outcomes require experiences that are technology based
- assessment and reporting of student performance at provincial and jurisdictional levels includes information on technology competencies
- multimedia is used to improve learning and understanding of difficult concepts and relationships
- profiles of student work presented to parents contain demonstrations of skills and learning related to technology competency and use in processing, managing, and analyzing information
- gains in student performance are expected as a result of technology integration

IMPROVING STUDENT LEARNING

• students are at the centre of education planning and delivery
• students take ownership of their own learning
• learning systems are used to personalize learning and to address learning needs
• students at all levels interact with teachers and experts via technology
• students take advanced level courses while completing graduation requirements
• students complete courses at their own pace using multimedia learning and courseware
• via technology, learners collaborate with other learners on projects
• school programs are taken as independent study, or through open learning
• students are independent lifelong learners

LEARNING RESOURCES

- learners have ready access to up-to-date computers and productivity software tools
- learners access multimedia databases (content) from distant servers via a provincial learning network
- schools regularly use interactive video and computer conferencing to provide specialized instruction and programs
- multimedia courseware is available for extensive use by teachers to improve instruction and learning
- assessment (diagnostic and other) databases are used
- a wider variety of program options is available to learners
- virtual reality simulations are used extensively to engage and motivate learners

INFRASTRUCTURES

• students have ready access to a provincial learning network, and Internet and Intranet services
• students and teachers are able to interconnect provincially via E-mail and Intranet board services in all Alberta schools
• on-demand courses at the high school and introductory college/university levels are available through satellite broadcast, cable, or other means
• on-demand is available to learners and schools via cable or the Internet
• scheduling improves
• students collaborate with others in a province, nationally and internationally

PLACES OF LEARNING

- learners have choices of taking their education in schools, at home or in privately operated learning centres
- more learning takes place off-campus, at home, or other places convenient to the learner
- virtual schools and virtual learning centres are available for learning
- community access centres, with full telecommunications capabilities, are available throughout the province
- school districts offer skills upgrading to the community and business
- continuing education is available at various times and places