Perceptions on the Ground:
Principals' Perception of Government Interventions in
High-Speed Educational Networking

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Abstract

The Alberta SuperNet was built to bring broadband connectivity to every school, hospital, library and provincial government office in Alberta (a large province in Canada with an area of 255,285 square miles). The supposed benefits of high-speed access have led to calls for strategic public investment on both the supply and demand sides. The provincial government, through Alberta Education, initiated a number of interventions to help make broadband technology more useful and accessible to Alberta schools and to promote use of the new technology. To investigate the perceived efficacy and awareness of these initiatives, a survey of school officials was conducted in the spring of 2005. The survey was designed to assess the interest, awareness and planned use of high-speed networking initiatives by school officials. The results of the survey show that principals place relatively high levels of importance upon these initiatives but their level of awareness of, and especially their utilization of the initiatives was much lower. There were small but significant differences among principals from large versus small schools and between principals from rural versus urban school. The paper concludes with recommendations for policy makers and administrators challenged with creating effective interventions using broadband networking.

INTRODUCTION

Broadband development has been linked to a variety of indicators of economic, social, and community health and well being (Organisation for Economic Co-operation and Development [OECD], 2003). The Canada National Broadband Task Force (2001) recommended that broadband be made available to every community in Canada. They argued that "access to broadband is necessary to create jobs, to provide quality education and health care, and to help maintain the vitality of rural and northern communities" (Johnson, 2001). These claims have led to calls for strategic investment by local, provincial and national governments in broadband deployment on both the supply and demand sides. Supply side interventions typically include funding or subsidizing costs associated with a network infrastructure and other tailored forms to increase the quality and quantity of broadband service (TechNet, 2003). Demand side interventions usually focus on communication and consultation, application development, aggregation of demand, training and other strategies. The strategies are designed to increase the visibility and raise awareness of the relative advantage of the new technologies (Rogers, 2003). For example, the European Union and its member states have undertaken a variety of initiatives, including funding of pilot applications, research interventions, teacher training initiatives, and sharing of best practices (see http://europa.eu.int/information_society/eeurope/2002/action_plan/eeducation/eu/targets_2000/index_en.htm).

This paper addresses the Alberta government's involvement in broadband deployment for educational applications. Canada, and Alberta in particular, is not unique in its interest in the value of high-speed networking to enhance social, economic, health and educational development. In the United States, the industry group "TechNet" evaluated state policies in 2003 that were designed to stimulate broadband activity. They argue that "state governments will
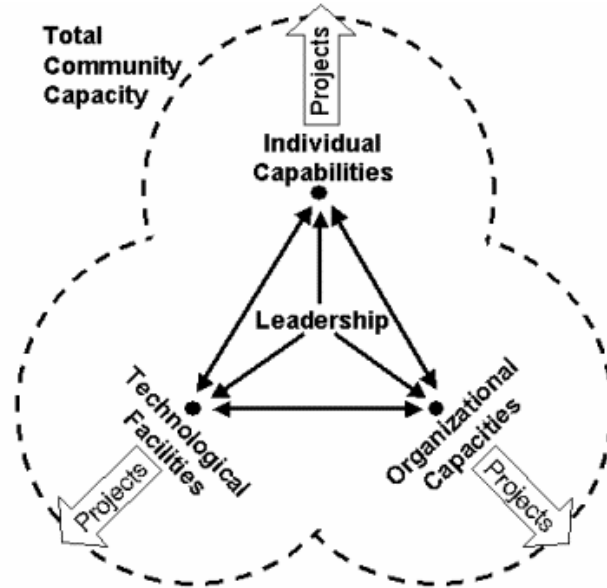
benefit from increased broadband deployment that enables them to function more efficiently and improve the delivery of vital services to their citizens" (TechNet, 2003). The Australian government focused on availability, initiatives and issues in their 2002 report entitled *Broadband in Education.* It was recognized that "despite a shift in recent debate to the demand side of broadband development, the supply side remains the most pressing issue for educational institutions" (Commonwealth of Australia, National Office for the Information Economy, 2002).

In response to these pressures and opportunities, the Alberta government announced in 2001, the funding for an ambitious broadband deployment across the province. The Alberta SuperNet (see www.albertasupernet.ca) is a $294 million, government sponsored broadband networking initiative. With the formal completion of the SuperNet on September 30, 2005, high-speed broadband connectivity was made available to approximately 4,700 public institutions including every school, library, hospital, and provincial government office throughout Alberta. The SuperNet connects 429 communities by providing high-speed networking for public and government operations. As well, the SuperNet commercially distributes bandwidth at urban price levels, to local and regional Internet Service Providers (ISPs) to provide network access to businesses and residences.

Supply side incentives specifically devoted to enhancing broadband use in education are not common. However, educational applications are consistently noted as major broadband applications and are often identified as key target areas for potential use. Reports, as noted above, tend to conclude that there is a latent demand at all levels in the education system for increased access to broadband networks. For example, the British Broadband Stakeholder Group's report (2002) recommended that the government expend efforts "motivating users and decision makers to ensure that the deployment of broadband becomes an educational 'pull' rather than a technology 'push' (p.4). Barriers have been noted on both the supply side and demand side providing rationale for public sector policy and action. For example, a barrier on the supply side is the capacity for private or public providers to deliver broadband connectivity at prices that are affordable to public education users. A barrier on the demand side is the need for cost-effective and learning-effective educational applications that make effective use of reliable broadband technologies.

The SuperNet has delivered high-speed connectivity to every school in Alberta. However, it is well known that creating technology opportunity alone does not guarantee its effective use (Bijker, 1999; Laudeman, 2003; Rogers, 2003; Surry & Farquhar, 1997). In particular, we agree with the pragmatic notion argued by Laudeman (2003) that "IT [Information Technology] can only be valuable, if it helps meet their [(the users)] needs and solves problems." Laudeman presents a three-legged model (see Figure 1) for what he terms "digital development." In this model, total community capacity to use a new technology effectively is dependent upon three interacting components: technological facilities, organizational capacity, and individual capabilities. Each of these components is dependent upon leadership to coordinate and champion projects which instantiate and thus create the necessary capacity in each of the domains.

Figure 1. *"Three-legged stool" of digital development (Laudeman, 2003)*

Alberta Education, the education ministry of the Alberta Government, initiated a number of interventions beginning in 2001 to help make the SuperNet technology more useful and accessible to Alberta schools. Mapping these initiatives to Laudeman's model allows for categorization of these initiatives as outlined in Table 1.

In sum, these initiatives seem to address the three components of Laudeman's model, as well as targeting each of the three major groups (teachers, technical staff and administrators) of end-users. Therefore, theoretically, these initiatives are likely to meet the needs of the education system when a major intervention is being implemented. However, it is useful to note the critical role of leadership and projects in Laudeman's model. First, positive results are unlikely if key school leaders (i.e., principals at local schools) are not aware of, do not perceive value, or have not utilized these initiatives. Second, at this early stage there are very few explicitly funded pilot or demonstration projects (with the exception of a few video-conferencing trials) operating that are specifically designed to exploit the high bandwidth capacity of the SuperNet intervention. Pilot and demonstration projects provide visibility of applications to demonstrate its utility and advantage over other networking and non-networked alternatives.

This research study seeks to assess if key school leaders (i.e., principals at local schools) are aware of, have utilized, and perceive value in the Alberta Education initiatives relating to the Alberta SuperNet application in Alberta's schools. The research addresses two major questions:

1. What are the perceived importance, awareness and use of government interventions designed to promote effective use of the SuperNet?
2. Are there differences among principals of large versus small and rural versus urban contexts with regard to their perceptions of these initiatives?

The answers to these questions will inform the current users, planners and builders of SuperNet applications. As well, it will be of value to potential end-users and decision-makers considering supporting educational use of high-speed networking in other jurisdictions. The US Committee on Broadband Last Mile Technology (2002) noted that "the threshold issue is how to

determine whether government intervention to accelerate broadband deployment is necessary or desirable" (p. 205)

Table 1. Alberta Education's Initiatives Mapped to Components of Laudeman's (2003) Digital Development Model

Digital Development Model Component	Alberta Education Initiative	Description of Initiative	Target Audience
Individual Capabilities	1. Teacher training and exposure	Alberta Education has offered introductory and professional development sessions for teachers related to applications of the SuperNet. These sessions are usually face-to-face and often in conjunction with larger professional development events or conferences	Teachers
	2. Video-conferencing support portal	Alberta Education has funded a team of university researchers to create a video-conferencing portal with guides, training and discussion opportunities (see http://VCAlberta.ca).	Teachers and administrative staff
Technological Facilities	3. Software standards	For enhanced compatibility and interoperability across the system, Alberta Education is adopting technology standards for particular software (e.g., province-wide license for the Microsoft Office™ suite (see http://www.education.gov.ab.ca/ technology/Solutions.asp).	Technical staff
	4. Content delivery device	To help avoid network traffic congestion in the use of high bandwidth video-streaming resources on the LearnAlberta.ca website, schools are being provided with a specially designed content delivery device. The computer with large storage capacity enables the local caching of school resources, thereby facilitating high-speed access to multiple end user computers.	Technical staff
	5. Technical training	Developed and delivered through the Northern Alberta Institute of Technology (NAIT), the SuperNet Technical Training Program is a series of courses consisting of one online and three two-day courses that provide training for information technology personnel who are involved with setting-up and supporting the SuperNet network (see http://www.nait.ca/supernet)	Technical staff
	6. Technical standards	Alberta Education is adopting technology standards across the province, such as recommending the use of the international H.323 standard for video-conferencing and metadata standards to describe learning objects, thus ensuring that access will not be impeded by incompatible equipment or systems.	Technical staff

Digital Development Model Component	Alberta Education Initiative	Description of Initiative	Target Audience
Organizational Capacity	7. LearnAlberta content repository	This learning object repository provides multimedia learning resources that are directly associated with particular learning objectives of the Alberta program of study. Teachers, parents and students can search for resources based on particular courses (see http://learnalberta.ca)	Administrative staff and teachers
	8. Video-conferencing research	Alberta Education is supporting a number of action research projects throughout the province that will explore, evaluate and document the use of video-conferencing in the schools. Key findings and effective practices from these projects will be shared across the system.	Administrative staff and teachers
	9. Video-conferencing financial support	Alberta Education announced in February 2005 that the government will provide $60,000 for each school district to purchase video-conferencing hardware, training or support to insure hardware availability to access the SuperNet.	Administrative staff

METHODOLOGY

This research study used a self-administered survey methodology due to the cost effectiveness, reach and convenience of this tool for both respondents and researchers (Dillman, 2000). The survey methodology also provides the capacity to reveal quantitative differences in perceptions among subjects. The survey instrument was developed by the authors based on earlier interviews and focus groups with distance education teachers and administrators (see Anderson, 2003; Posente, Rourke, & Anderson, 2005).

Invitations to participate in the Alberta SuperNet research survey were sent out on March 19, 2005 to all 1,960 school principals in the province of Alberta. Location and address information from the subject pool was obtained from Alberta Education. A reminder notice was sent a month later to all individuals who did not respond to the original invitation. In total, 295 survey responses were received (only15% of invitees provided a survey response). Discussions with principals led us to understand that principals are inundated with survey-type requests, that some of the respondents thought the survey was of little use since the SuperNet had not yet been implemented in their divisions and finally some districts (notably one of the two very large urban districts) actively discourage research assignments that are not specifically scheduled by their central office.

The population to be surveyed was split into four groups in order to fulfill a secondary research goal of determining which survey invitation method (email or postal delivery) produced the highest return rate (online or postal responses). Table 2 details the Alberta SuperNet research survey return rates. It is interesting to note the much large response rate from those principals

who received post (as opposed to electronic) invitations, indicating a higher sense of responsibility to complete paper as opposed to electronic requests for participation in the survey.

Table 2. Return rates obtained in the Alberta SuperNet research survey

Method of Survey Invitation and Submission	Return Rate (% of surveys by delivery method)	Return Rate (% of total 1,960 surveys sent)	Return Rate (% of total 295 surveys returned)
Postal service invitation and postal (print format) submission	33%	8%	54% (n=160)
Email invitation and online web-based submission	14%	4%	23% (n=69)
Postal service invitation with online web-based submission	8%	2%	14% (n=40)
Email invitation and email submission	5%	1%	9% (n=26)
Total/Average	15%	15%	100%

RESULTS

In Table 3, Alberta Education's nine initiatives and the mean survey scores of the respondents are listed in three areas: deemed importance of the initiatives, their (or their school's staff) awareness of the initiative, and perceived usage of the initiative.

Table 3. Perceived Importance and Awareness and Use of Alberta Education Initiatives

	Importance	Awareness	Utilization
1. Software Standards	4.22	3.32	2.74
2. Video-conferencing Financial Support	4.09	3.16	3.32
3. Teacher Training and Exposure	4.02	2.02	1.22
4. Technical Standards	3.89	1.96	1.32
5. LearnAlberta.ca	3.77	4.40	3.36
6. Content Delivery Device (CDD)	3.77	2.64	1.24
7.Technical Training	3.65	1.46	1.06
8.Video-conferencing Research	3.64	2.72	1.40
9. Video-conferencing Support Portal	3.63	1.80	1.28

Table 3 Note. The scale for importance is based on calculation of the mean from 5-point Likert like scales. The scale for awareness and utilization was calculated by converting the survey response (yes, no or somewhat) to a numeric value. Values were recoded to a five-point number scheme for ease of comparison.

Not surprisingly, the highest rated initiative in terms of awareness and use is the LearnAlberta.ca learning object repository, being the oldest of these initiatives and the one potentially most relevant to teachers, students and parents. Interesting, though, is that despite principals' awareness of this learning object repository, it is only ranked in the middle tier in perceived importance behind standards, financial support and teacher training. Software standardization and the accompanying provincial licensing of Microsoft Office™ products at no cost to local schools was deemed to be of highest importance and was relatively well utilized. Given the financial focus of many principals and especially those working under school-based budgeting models, the financial support for video-conferencing was also deemed important. Interesting though, efforts to support teacher training were perceived as very important, yet awareness and most importantly utilization of this resource was very low. Likewise, awareness of and use of technical training, action research and the video-conferencing research and portal support were relatively low, likely indicating a need for more communication of these initiatives to potential end-users.

Contextual Differences in Survey Results

Adoption and use of a complex innovation, like the SuperNet, is directly related to the local context in which it is introduced (Bijker, 1999). Of the many contextual variables that distinguish Alberta schools, we have chosen to investigate the relationship between school sizes (small versus large) and school locations (urban versus rural).

School size and its relationship to achievement, cost and perseverance has been investigated for years (Raywid, 1999) with varying results. Generally, the research findings favour the outcomes associated with smaller schools over larger ones. However, smaller schools are generally more expensive to operate. Therefore, an intervention such as the SuperNet, with principals' perceptions of higher cost to local schools, may be less attractive to principals of smaller schools.

Although rural students report roughly the same use of information and communication technology (ICT) in schools as their urban counterparts, they have a lower rate of access at home and thus place higher importance on access from schools. In a study of Canadian rural school use of ICT, Looker and Thiessen (2003) note the largest technical discrepancy between rural and urban schools relates not to their access to machines, but rather their access to networking capacity. They note that "as more and more resources become available via the Internet, these discrepancies, if not countered, will have serious implications for the divisions among youth in terms of their access to the presumed benefits of the information society" (p. 20). Rural locality in Canada has also been shown to be related to less likelihood of formal professional computer coordinator time and expertise availability, less opportunity for technical training for teachers, and lower availability of curriculum-related software (Looker & Thiessen, 2003). In Scotland, Mason and Rennie (2004) note that connectivity issues exacerbate efforts at bridging the digital divide between rural and urban school users.

School size

The majority of schools in this sample (59%) have between 201 and 1,000 students. Only 6% of the schools have more than 1,000 students and the remaining 35% are small schools (less than 201 students).

Multivariate analysis of the data revealed that there was a significant overall difference on the dependent variables between the different size schools. (Wilks' Lambda 1.69, F=1.68 p<.01). Therefore, individual ANOVAs were calculated on the means of the services variables

between small, medium and large schools. These results are reported in Table 4. The table lists the initiative along with significance of the initiative as perceived by respondents. The significance level shows differences in relative importance, awareness and utilization as perceived by respondents.

Table 4. Significance of functions and services according to the independent variable number of students in the particular school

	Importance	Awareness	Utilization
1. Teacher Training and Exposure			***
2. Video-conferencing Research and Support		**	***
3. Software Standards	**	**	
4. Content Delivery Device (CDD)	**	*	**
5. Technical Training			
6. Technical Standards	*	**	***
7. LearnAlberta.ca			
8. Video-conferencing Financial Support			*
9. Video-conferencing Support Portal		**	***

*** $p<.001$, ** $p<.01$, * $p<.05$

School location

In all cases with significant differences (and all but one with smaller non-significant differences), the larger schools deemed the initiatives to be more important, were more aware of the initiative and had utilized the service more than principals from smaller schools. This may indicate a greater capacity, time availability and interest by principals from larger schools to be exposed to the initiatives. As a result, they may be more inclined to value and use the services. Larger schools may also have greater access to technologies and allow more specialization, freeing teachers to keep current with developments such as the services associated with the impending SuperNet deployment. Surprisingly, those services that focus on the SuperNet's capacity to support distance delivery (videoconference research and support) did not appear of more importance to smaller schools, as it is often assumed that small schools are more likely to be interested in distance education programming. However, this potential interest may be subservient to the lower information availability noticed by principals of smaller schools.

Small and large schools exist in both urban and rural locations. The data however show a significant (.001) Pearson r. correlation of .272 between school size and community size. This indicates that smaller schools are more likely to be located in rural locations. The location (urban versus rural) of the schools were dispersed across the size-based categories. Of the schools 36.6% are located in a rural community with a population of less than 5,000 people, 26.1% of the schools are located in a small urban community with a population between 5,000 and 25,000 people, and 37.3% of the schools are located in a large urban community with a population over 25,000 people. These figures are skewed towards smaller communities than would be expected based on the Alberta population, indicating that slightly more of the rural school administrators

responded to the survey. It is recognized that this potentially sets a rural bias in the survey results.

A multivariate MANOVA was calculated using location of the school as the independent variable. It revealed that there were significant (Wilks' Lamba =.853, F= 1.56, p <.05) differences between the variables based upon school location. We proceeded with ANOVA calculations. Those with significant differences are reported in Table 5. The table lists the initiative along with significance of the initiative as perceived by respondents.

Table 5 shows that there was much less significant difference with regard to perceived importance, awareness, or use of the nine Alberta Education initiatives between rural and urban schools as compared to that between large and small schools. Interestingly though, all of the significant differences, and most of the non-significant differences, were in favour of the rural schools having greater perception of the importance, value and actual use of these SuperNet applications.

Table 5. Significance of functions and services according to the independent variable location of school (rural or urban)

	Importance	Awareness	Utilization
1. Teacher Training and Exposure		*	*
2. Video-conferencing Research		***	
3. Software Standards			
4. Content Delivery Device (CDD)			
5. Technical Training			
6. Technical Standards			
7. LearnAlberta.ca			
8. Video-conferencing Financial Support	***		
9. Video-conferencing Support Portal			

***p<.001, **p<.01, *p<.05

The increased interest and awareness is likely related to the lack of high-speed connectivity in rural areas and the resulting educational component of the 'digital divide' (Looker & Thiessen, 2003). Rural school leaders are also more interested in most of the potential benefits of broadband service, especially those that reduce travel time and allow students to enroll in distance education courses (Anderson & Christiansen, in press). Therefore, it is not surprising that rural principals had generally higher ratings of perceived value and awareness of SuperNet interventions, even though the generally smaller size of rural schools, confounds this increase with the generally lower awareness of smaller school leaders.

DISCUSSION

Before discussing these results, a serious weakness of the study must be explored. The return rates of all but the paper/mail-based survey was much lower than expected and certainly lower than desired. There are a variety of reasons to which this can be attributed and some were briefly discussed earlier. However, the rate of email and web-based returns was lower than what one would expect for electronic surveys based on other studies using this form of survey (Anderson & Kanuka, 2003). This may be because many of the email addresses used were to the school, rather than being personally addressed to the principal. This may have resulted in a loss of some of these emails or delays in timely arrival at the principals' computers. The low return rate may also indicate that email use is not as prevalent in this population as we had been led to believe. In any case, the low return rate makes it impossible to generalize to the whole population of school principals. Nonetheless, we hope that the quantitative data, as well as the qualitative quotations, in this section will still be of use in creating an understanding of the complex issues relating to the adoption of expensive technology-driven interventions.

The Alberta SuperNet is designed to bring high-speed connectivity to every school in Alberta. To prepare, train and expose end-users within the education system to the affordances of this intervention and to train support staff effectively, Alberta Education undertook a series of proactive initiatives. The level of awareness, rate of utilization and perceived value of these services varies among provincial school administrators, as evident in the survey results.

Each of the nine Alberta Education initiatives are generally valued by school principals. The learning object repository is well known and used. Software standardization, most importantly the licensing of Microsoft Office™ products, is considered valuable and well used. Initiatives with a low utilization rate include teacher training, technical standards, content delivery devices and the technical training video-conferencing research and portal. The generally high level of importance of the nine initiatives as deemed by survey respondents, yet low utilization rate of many of the initiatives, shows a weakness in the effectiveness of the programs to meet their objectives. The level of awareness is particularly low regarding teacher training, technical standards, content delivery devices, technical training, video-conferencing research and portal. The combination of relatively high levels of perceived importance, yet generally low levels of awareness and usage, illustrates a need to increase communication to end-users. The importance of support initiatives is generally perceived as important, but awareness of actual programs and subsequent usage is much lower.

Finally, this study sought to determine if there are differences among principals of large versus small schools and also rural versus urban schools in regards to principals' perceptions of the nine initiatives. Survey results show that principals of larger schools deem the initiatives to be more important and they are more aware of the initiatives than principals from smaller schools. Principals of larger schools also utilize the SuperNet initiatives to a greater extent than their small school counterparts. Enhanced communications efforts should be directed to smaller schools to ensure equitable understanding and subsequent utilization of the SuperNet initiatives.

Differences between perceptions of rural, medium-sized communities and urban principals were also significantly different, but these differences were smaller than those between large and small schools. Survey results show that principals of the rural schools perceive greater usefulness of SuperNet applications such as video-conferencing research and support. Rural schools with their location challenges seem to have a greater appreciation for the

capabilities of the SuperNet applications and accompanying need for teacher training (Anderson & Christiansen, in press). One survey respondent summarized this perspective by stating:

> *I believe that completing the SuperNet will start to even the playing field between rural schools who are unable to do activities involving Internet access and urban schools who can. Rural schools will have a lot of catching up to do. Rural teachers will have to be retrained to use the Internet.*

A number of key issues were highlighted by respondents that we use to conclude this study. Many survey respondents expressed concern with the lack of end-user involvement in the SuperNet development process. This common perspective is illustrated in the following three quotes.

> *For me, the SuperNet project has been shrouded in mystery. As principal of a forward-thinking school community, I can tell you we want to be at the cutting edge so have been proceeding on trust that this is a great opportunity for schools in Alberta. Communication regarding SuperNet must become much better in the future if we are to be aware of its true potential.*

> *We all know it is happening but we have no idea when it will materialize. This project has been very vague from the beginning.*

> *In regard to video-conferencing, teachers were not involved in this decision. We were told at a meeting we were getting some, we had no input. The decision was made by our office tech person. No teachers were consulted and there was no plan for in-service shared. Seems like it could be a waste of money without some support.*

It seems obvious from these comments that end-user involvement in the SuperNet initiative has been minimal. Despite the efforts at developing the nine initiatives, what seems lacking is a means by which principals can make meaningful contributions to the planning, piloting and early use of this new infrastructure. In the absence of this input, coupled with unfortunate delays in implementation, significant levels of frustration have resulted.

Recommendations for Practice
Based on the survey responses, we offer the following five recommendations for practice:
  1. Involve potential users in the process of application development. Low levels of awareness of some initiatives are a concern. Effective use of new technologies in education typically only comes with bottom-up demand and support for services coupled with top-down funding and policy integration. (Surry & Farquhar 1997). The use of the SuperNet itself to demonstrate and develop compelling educational applications in a bootstrapping manner is highly recommended.
  2. Despite the large investment of public monies in the Alberta SuperNet, there has been no related program to measure its effectiveness in meeting public and private sector goals. This is in contrast to initiatives in countries such as Australia in which their investment in broadband is relatively modest, yet they have developed a National

Broadband Strategy that funds an implementation group. The group is charged with aiding and assessing development of broadband initiatives. This is undertaken by developing key performance indicators, as well as other research and dissemination programs (see http://www.dcita.gov.au/__data/assets/pdf_file/23712/NBSIG_Action_Plan.pdf). Similar efforts to measure and document use and impact on a variety of educational input and output measures are needed.

3. Use the networks to create professional development centers, including portals with synchronous and asynchronous events. There is interest in the capacity to use broadband networks for professional development, yet little actual programming from any of a variety of potential sources.

4. Create more demonstration projects (such as the current videoconferencing demonstration projects). School leaders are often reluctant to expend the time and energy needed to conceptualize and operationalize applications without a clear idea of what they are constructing. Rogers (2003) identified visibility as a key component of innovation adoption.

5. Develop the means and capacity to evaluate and document these demonstration projects using broad design-based research methodologies (Anderson, 2005) that assesses educational inventions in multiple contexts.

High-speed networking is critically important for efficient information transfer and distributed group collaboration. High-speed networking is essential (or at least very desirable) for many new educational applications including distance education and social software applications and thus a necessity for most education systems. From our capacity to access and share information and create distributed communities, develops the capacity to generate knowledge and apply this knowledge wisely and cost-effectively. The deployment of the Alberta SuperNet provides the infrastructure to realize the benefits of distributed teaching, learning and administration. However, barriers to the adoption by end-users of high-speed networking exist (Anderson & Christiansen, in press). The adoption of the Alberta SuperNet by school officials is challenged by technical, political and social factors. High-speed connectivity offers benefits that can be realized only if end-users understand its technical merit and choose to adopt the innovation. The SuperNet was envisioned and implemented by Alberta government officials rather than end-users resulting in political factors hindering adoption. Finally, the social factors relating to inability to observe and participate in the development of the SuperNet has hindered the awareness and likely the rate of adoption of this intervention.

The SuperNet broadband capabilities and Alberta Education initiatives to support their adoption and effective use are evidently valued, but not yet widely used by school officials. The success of these initiatives and of the larger SuperNet intervention requires end-users' awareness and further involvement in order to generate use and application. Effective adoption of the innovation depends on high levels of end-users perceiving value and using the Alberta SuperNet. The nine Alberta Education initiatives discussed and surveyed in this study are important and useful support programs that are likely necessary to ensure effective use of this expensive investment of public monies. However, the apparent lack of awareness and use of these initiatives reinforces the notion that one cannot "build it and they shall come." Rather, continuing efforts must be expended at all levels of the educational system if effective adoption of broadband capacity and afforded applications is to take place.

Contributors

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