Video Conferencing at McBride Secondary School:

Case Study and Recommendations

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During the winter of 2007, the research team visited schools and community institutions in McBride and Prince George to conduct interviews as part of the "Video Conferencing at McBride Secondary School Project". We wish to express our appreciation to all the individuals who took time out of their schedules to participate. Thanks to the teachers, educational community members, and community groups who helped out. Their response and enthusiasm demonstrates the importance of this issue within the community. The insights provided through these findings will support a better understanding of distance education in the rural and small town places in northern BC.

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Rosemary Raygada
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Availability

Copies of all reports associated with the "Video Conferencing at McBride Secondary School Project" are available in a number of locations. In McBride, copies have been deposited with the Village Office and the public library. Copies of this report have also been sent to McBride Secondary School, Prince George Secondary School, Kelly Road Secondary School, and the Robson Valley Home Support Society. At the University of Northern British Columbia, copies have been deposited at the Weller Library or can be accessed on the Community Development Institute website: http://www.unbc.ca/cdi/research.html.

Project Reports

- Executive Summary
- Methodology Report
- McBride Case Study and Recommendations

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1.0 Project Description

Technology plays a crucial role in the transformation of society. Communities are integrating the tools of these technologies in their own development processes. The education sector – one of the cornerstones of society's development – uses these tools to enhance the process of teaching/learning, and to address the educational needs of those who are unable to attend schools, universities, and other educational institutions for various reasons.

Schools in northern British Columbia, as in other rural locations in Canada, have the capability to use video conferencing as a tool to reach students in remote locations and to provide them with the same opportunities for learning as students in urban centres. However, it is important to understand how video conferencing contributes to student learning, to teaching methods, and to community capacity building.

The purpose of this research is to explore the impact of a video conferencing pilot project in developing educational opportunities in McBride, BC. This pilot project was initiated by McBride Secondary School in conjunction with Prince George Secondary School and Kelly Road Secondary School. The project operated for four years between 2003 and 2007. The objectives of this study are:

a) to provide information about project planning, operation, and financial sustainability;
b) to understand the impact that video conferencing methods have had on teaching and learning at McBride Secondary School; and
c) to describe the impacts that this pilot project has had on other service institutions in the McBride community.

This report begins with a brief overview of the emergence of the video conferencing pilot project at McBride Secondary School, including a description of the development of communication and technology services that were instrumental in providing a base of support for the project. The study also situates the video conferencing project within wider goals of building community capacity by understanding the context and needs of service providers and community organizations. The next section of the report focuses upon the achievements and limitations of using video conferencing technology to deliver distance education to high school students in McBride. Based upon the experiences of those involved, the final section outlines a series of recommendations to improve the sustainability and effectiveness of future video conference distance education courses in rural and small town places.

Section 2.0 General Characteristics of the McBride Area

The Village of McBride is situated approximately 220 km east of Prince George along Highway 16 in the Robson Valley. McBride is a small town with a mixed economy grounded in forestry, agriculture, transportation, and tourism. The village also functions as a service centre for many of the surrounding smaller communities, such as Dome Creek and Dunster (Halseth *et al.* 2005). Despite a relatively diverse economy, McBride has experienced a series of restructuring pressures that led, as one example, to the closure of McBride Forest Industries in 2006. The Softwood Lumber Dispute, Mountain Pine Beetle epidemic, rising Canadian dollar, extreme weather events, and new regulations governing agricultural practice posed additional challenges to the local economy. It is well understood that educational services provide an important foundation to assist local residents to cope with such pressures.

Economic fluctuations can have a number of implications for the local population. The loss of industry jobs can also lead to a turnover of key personnel in the service sector as families leave to find places that can offer employment for both spouses. The loss of industry jobs tend to be accompanied by an out-migration of young families, resulting in smaller student enrolments at local schools.

The 2006 population of McBride was 660, a decline of 3.2% since 2001 (Statistics Canada 2006) (Table 1). In 2006, the population is fairly evenly distributed across residents between 10 and 59 years of age. Having said this, McBride has experienced a small loss of young families during each census period. This is demonstrated by a lower proportion of the population under 20 years of age in 2006 compared to 1996. This is also accompanied by fewer residents between 30 and 44 years of age.

Table 1: Population changes in McBride: 2001-2006

Population	**1996**	**2001**	**2006**
Total – All persons	**765**	**720**	**660**
Age 0-4	70	50	40
Age 5-9	55	60	40
Age 10-14	65	50	55
Age 15-19	50	55	45
Age 20-24	50	45	45
Age 25-29	55	45	45
Age 30-34	75	40	40
Age 35-39	50	70	45
Age 40-44	65	50	45
Age 45-49	45	65	50
Age 50-54	35	45	55
Age 55-59	25	35	45
Age 60-64	25	25	30
Age 65-69	25	25	15
Age 70-74	25	25	20
Age 75-79	20	20	15
Age 80-84	15	10	20
Age 85 years and over	10	5	10
% of the population under 20 years	31.4%	29.9%	27.3%

Source: Statistics Canada 2006.

Section 3.0 The Emergence of Video Conferencing in McBride

McBride residents have access to a range of local services, such as retail, health care, retirement facilities, and cultural-recreational facilities. However, communication services can be very important for relatively isolated rural and small town places, especially during the winter when travel to other places can be limited due to poor road conditions. In the context of this study, communication infrastructure and expertise is also important for providing tools to support alternative options for delivering distance education.

Internet clients in McBride, however, have experienced many problems due to the lengthy period required to develop communications infrastructure and due to the restructuring of Internet service providers. In April 2002, the McBride Internet Society no longer provided Internet service to residents (Table 2). For the next year, Internet service would be provided to McBride residents through Valemount Networks and DSD computers. In 2003, a dispute between these two businesses meant that Valemount Networks would no longer provide Internet service, and many residents switched to a dial-up service provided by Telus.

Table 2: Changes in Communications Infrastructure and Services

Apr. 2002	-In early April 2002, the McBride Internet Society discontinued its Internet service and customers were forced to switch to the Valemount Networks.
Jan. 28, 2003	-The federal government announced $105 million for Rural and Northern Development Pilot program. A proposal called Broadband Connectivity for Healthy Communities in the Canoe-Robson Valley was submitted to obtain high speed Internet access for Albreda, Valemount, Tete Jaune, Dunster, McBride, Crescent Spur, and Dome Creek.
Apr. 15, 2003	-McBride lost an Internet service provider. They could not yet contract with TELUS.
May 20, 2003	-A dispute between Valemount Networks and DSD computers caused a lapse in service for Internet users in McBride. Valemount Networks and DSD had worked together to provide Internet to McBride for about a year.
May 27, 2003	-TELUS proposes to provide Internet service to McBride and Valemount by the late fall or winter.
Sept. 23, 2003	-Valemount Networks to leave McBride. McBride users have been switching towards a dial-up service provided by TELUS.
Nov. 4, 2003	-Along with Industry Canada's promised investment to introduce broadband Internet to the Canoe-Robson Valleys, TELUS says it's close to implementing ADSL in Valemount and McBride. ADSL means flat rates versus per hour billing and will not tie up phone lines; thereby expanding Internet use.
Apr. 7, 2005	-Broadband expansion spells opportunity for B.C. (Ministry of Management Services 2005).
Jul. 3, 2008	-Updated Schedule of Community Connections. (Premier's Technology Council 2007).

Source: Robson Valley Times 2003.

A series of provincial and federal government programs have provided funding for communication infrastructure that has benefited many local service providers. For example, in 2005, the McBride and District Hospital acquired video conferencing capabilities and telehealth services (Robson Valley Times 2005).

The Premier's Technology Council (2007) identified 366 communities that were deemed a priority to receive high-speed Internet access. From this, the Province and TELUS jointly prioritized infrastructure improvements for 151 communities. For McBride, it was determined that the installment of new infrastructure to provide higher levels of bandwidth would be provided to residents in 2007.

In terms of educational services, families still have concerns about post-secondary opportunities for their children. Educational services available in McBride include pre-school / kindergarten, elementary school, high school, and educational facilities that provide cultural activities, such as the public library, theatre, and art gallery. The Robson Valley Home Support Society also provides some training and general employment programs. However, there is no community college, university, or other forms of post-secondary education. In 1984, the Canoe Robson Educational Development Association (CREDA), a non profit organization, was established with grants from the College of New Caledonia. By 2002, the College of New Caledonia eliminated its funding for CREDA in McBride due to budget cuts, and this institution closed its operations in 2003 (Robson Valley Times 2003). The loss of this distance education facility was significant for residents. Students were required to commute or relocate to distant urban centres to pursue post-secondary education. After their studies are completed, they may continue to live in these centres, or move to other places to start their careers.

Youth have an opportunity to finish secondary school in McBride; however, in recent years the number of students has declined. In 2006, Karen Russell-Janecke, the Principal of McBride Elementary School and the Dunster Fine Arts School, told the Robson Valley Times that the number of students were down in McBride. In 2006, numbers show that there were 114 students in McBride, down from about 128 students in the previous year (Robson Valley Times 2006).

Prior to 2003, McBride Secondary School experienced challenges offering required courses that students needed to attend university. Course offerings were limited due to a lack of teachers. In 2003, the school's administration decided to pursue video conferencing as a tool to deliver shared courses with other schools in Prince George (Table 3). With high resolution and speed of transferring messages in real time, video conferencing could connect students, teachers, and other community members with other video conferencing settings elsewhere in the world. Through video conferencing sessions, teachers could interact with other teachers in distant locations. Regardless of winter road conditions, meetings with the school board or district Parents' Advisory Committee could be maintained. The school could also encourage other service providers or community groups, such as health professionals or tourism operators, to use the video conferencing equipment to meet other local development needs.

On September 23rd, 2003, McBride Secondary School announced that it would start offering Physics 12, French 12, and Geography 12 as part of its curriculum using video conferencing to connect students with schools in Prince George (Robson Valley Times 2003). Equipment and

infrastructure was purchased and installed before 2003. A proposal was sent to the Ministry of Education to obtain grant support to become a provincial "e-learning site". McBride wanted to be a pilot model in British Columbia for using video conferencing to deliver high school courses in small places that have difficulty attracting and retaining teachers. The provincial government provided McBride Secondary School with $75,000 to train teachers in McBride and Prince George to use video conference equipment to deliver distance education. In 2005, the provincial government would also provide funding for web conference tools at McBride Secondary School.

Table 3: The Emergence of the Video Conferencing Pilot Project in McBride

Jan.21, 2003	-New video conferencing suite at secondary school. The suite was set up for twenty people. A video conference demonstration was held at the end of January. Benefits are anticipated for students, teachers, health professionals, and locals working in the tourism industry.
Sept. 23, 2003	-Announcement: McBride Secondary School will start using video conferencing for Physics 12, French 12, and Geography 12. Previously, the school was unable to offer French 12, and Physics 12, which were taken by correspondence. These courses will now be administered by Kelly Road Secondary School in Prince George.
Oct. 21, 2003	-McBride Secondary School receives $75,000 in provincial funding for high tech schooling. Support from the Ministry of Education offers high school kids more course options in McBride. The one time grant of $75,000 is intended to help train teachers in both McBride and Prince George to use the video conferencing equipment.
Dec. 2, 2005	-McBride Secondary School amongst 91 schools in BC to benefit from provincial funding for web conferencing tools. This funding is an addition to previous support allocated for video conferencing tools to support distance education in McBride (Ministry of Education 2005).

Source: Robson Valley Times 2003; Ministry of Education 2005.

The high school principal in McBride noted that "our government exam scores went up and our overall base score went from 3.7 to 4.2, which I think is a substantial increase. This is our best report in five years and shows an upward trend." He further commented that McBride graduates 100% of its grade 12 students (Robson Valley Times May 2nd, 2007: 2).

4.0 Key Findings

This research investigated the impact that video conferencing had on student learning at McBride Secondary School and on other service providers in the community. As such, our findings begin by exploring the drivers or motivators for using video conferencing technology by both educators and service providers. As our primary focus was on the incorporation of video conferencing technology in a pilot project between high schools in McBride and Prince George, key strategies deployed to effectively teach through video conferencing are outlined. A number of limitations that prevented video conferencing technology from being used to its full potential are then discussed. These limitations ranged from a lack of training to limited resources to support the widespread adoption of video conferencing technology.

The findings are based on a limited number of key informant interviews. See Methodology Report for a discussion of the study methods.

Motivation for Using Video Conferencing

Participants identified many purposes and reasons why they used video conferencing. Due to a lack of teachers or low student numbers, video conferencing was used to provide more learning opportunities for students, and to enable students to acquire the education they needed to pursue college or university. Courses delivered through video conferencing partnerships across McBride Secondary School, Prince George Secondary School, and Kelly Road Secondary School included Physics 12, French 12, Literature 12, and Writing 12.

> *We knew that Alberta started the same experience two years ago. In small towns like McBride and Mackenzie, the students want to have the same scholarships and go to the same universities or colleges. However, they do not have the same access to certain courses as students in the larger schools, such as PGSS. In some cases, they do not have Physics, Writing 12, French 12, so we're trying to give them the same opportunities with video conferencing.*

Video conferencing has also been used for sharing information and resources amongst teachers in McBride and Valemount, as well as for connecting with conferences and meetings in larger urban centres. In this way, video conferencing has enabled service providers to connect more frequently with other professionals and decision makers in other places, while saving money and reducing the need to drive during poor winter road conditions. As one participant told us:

> *A lot of time, there are meetings that I have to go to in Prince George. There are times in the winter when the weather is very bad and you can't travel. This is the time when video conferencing makes sense because you go for a one hour meeting in Prince George, and it would be so much easier if you just go to the school and do an hour meeting in that room.*

Through the use of web cameras, some participants discussed the introduction of video conferencing in the home as residents are able to connect with family and friends in distant locations.

Really, in the future I think they will be a normal occurrence. Currently, they have a camera and they can talk with the grandma, the grandpa, and other relatives. Friends and kids are doing it all the time. Now every building in the town has Internet access. With high speed Internet, a person can be on the computer working and using the little window that pops up to communicate.

Such potential can provide a foundation for broader training programs and adoption of such innovative technology in rural communities. In the health and education sectors, video conferencing has also been used for counseling and health care meetings, as well as for training and diagnosis. In the future, participants would like to see video conferencing used to its full potential in McBride by using it to deliver training and testing for various certifications required for local jobs. One participant discussed the potential for video conferencing to support the development and transition of the local workforce in a manner that would be economically feasible for local families and residents.

Nowadays, for almost every job you need some kind of certification; even jobs that you wouldn't think of. Even if you want to work in a restaurant, you have to take a food safety course, and then you must drive all the way to Prince George to take that. But, if there is video conferencing, they could come here on Saturdays or go to the school and listen to the instructor, watch the demonstration, and read the material. If the response time is faster, then they could ask questions and have those questions answered. It would be very nice if you could study any subject over a distance; not at the university, but you get the package, and you study and read it.

When participants were asked to describe the demand for video conferencing courses, the numbers varied depending on the course and student needs. Student enrollment numbers in video conferencing courses ranged from 2 to 12 students at various sites. Of interest, participants talked about the potential to use alternative forms of technology to support video conferencing courses. However, limited demand or interest for such initiatives meant that innovative ideas were not pursued.

They should have had some recording, so the students could view the class again. There was no support for this. However, it would be possible if someone was interested.

Strategies for Effective Teaching Through Video Conferencing

There were specific strategies deployed to improve the interaction between teachers and students in remote sites, and to encourage students to be part of this innovative learning environment. The equipment was adjusted before the students arrived in the remote classroom. Once the students arrived in the remote sites, they were able to view their teacher immediately on the screen. Students in the remote sites were acknowledged at the beginning of the class and drawn into the host site. This was done through a simple "hello, how are you". On some occasions, teachers would include students from remote sites with humour expressed by students in the host site to develop cohesion amongst the entire group.

I tried to involve students who said something funny, so the kids in the remote site had an opportunity to have a late response laugh.

On some occasions, teachers from a host site would travel to meet the students in the remote sites in both McBride and Prince George. Teachers also developed peer groups and speaking activities in order to involve students in both sending and receiving sites.

Specific strategies were also devised to improve the delivery of teaching materials to students in remote sites. Teaching materials displayed on screen were designed with bigger spaces and larger font sizes. Smart boards were used[1]. Teachers would also situate themselves close to the camera for the entire group. Furthermore, participants described strategies used by teachers to support students and hear their concerns outside of classroom hours. These strategies ranged from exchanging e-mails to supporting a blog for students.

Using the blog, I created a form for the students, so they could e-mail me for any issues they are facing in the classroom. I received some responses. I received some e-mails about what was happening in the classroom.

Barriers to Using Video Conferencing

Lack of Training:

Participants were asked to describe any training or orientation sessions that were organized for video conferencing. In response, most participants stated that they received no training. Teachers were required to learn how to use the video conferencing technology on their own.

When I started, I acquired the knowledge by myself. I do not think that anyone else knew about it. When I entered the classroom, the TV was in a box. The room only had furniture. I tried to figure out how it would work. I set it up because they wanted to see a simulated classroom setting.

Some noted that they received advice and instruction from the high school in McBride. One teacher received mentoring from another who had taught through video conferencing in the previous year. Others noted that there are video conferencing workshops in Vancouver. There were several calls by others, however, to organize demonstrations or training sessions for teachers, students, or community groups in order to generate acceptance, knowledge, and basic trouble shooting skills with this technology. Teachers also felt that their course delivery would improve if demonstrations were provided where they could learn best practices of using video conferencing from experienced teachers. Some felt that teachers must be trained on techniques to constantly involve students from remote sites.

Despite these recommendations, some participants warned that there is a resistance amongst some teachers to receive training with video conferencing due to fears that the technology is

[1] Smart boards are an interactive display board that connects to a computer and digital projector to show your computer images. The computer is controlled from the board. Notes can be written on the board and saved.

replacing jobs. Others felt that a lack of interest in using this technology is preventing teachers from taking advantage of available information on the Internet.

Teaching Limitations with Video Conferencing:

In addition to limited training, participants identified a number of limitations experienced by teachers to using video conferencing to deliver education. One such limitation is about how to involve and facilitate interaction between students in both host and remote sites. On the one hand, there is a perception that teachers may forget about students in remote sites. On the other hand, teachers found it challenging to teach and develop a personal repertoire with students in both sites. At times, students in the host site became resentful of the time that the teacher allocated to remote students.

> *I found it far more preferable to teach in the class compared to on TV. I was glad when the TV was down. I could focus on the students here without trying to speak to two audiences. The students here resented this because I had to turn my attention to the kids elsewhere. They demanded too much of my time. The kids here did not like it. They spoke many times about it.*
>
> *In one of my courses, one of my students in Prince George said: "You spent more time asking them questions than us". I said "I have to involve them too, and if I do not ask them a lot, they are not going to be engaged", and I felt very bad when I said that.*

Teachers also face considerable difficulty assessing or controlling work habits and behaviour in remote sites. They are unable to discipline students or enforce expectations. They are also unable to assess the quality of student work during class hours.

> *It is very hard to keep their attention because you are not there. One day, I had to give a written assignment. They chose not to do it. I could not do anything about it. It is also difficult when they decide to walk out of the room.*
>
> *I received some e-mails about what was happening in the classroom. One student e-mailed me saying that he could not pay attention because some students were playing music. He could not concentrate. I phoned the principal to let him know.*
>
> *It is easier to see what students are doing in writing when you are with the kids. On the TV you cannot do that.*

Teachers may be unaware of how students are receiving their lessons in remote sites. For example, teachers were unaware of how loud they were coming across to students in remote sites. There were concerns with how materials are exchanged between teachers and students. E-mail and fax machines were used to send tests and assignments, but some remote video conferencing rooms were not equipped with this infrastructure. This resulted in several inconveniences for teachers, students, and school staff.

I e-mailed them too. I tried that instead of faxing. They had a printer in the room one year, so it was good. Otherwise, the students had to go to the library and print. I requested this access for the students to be able to print. I cannot imagine doing this without e-mail.

A final limitation is that some courses, such as art or language courses, that require more interaction were not deemed suitable to be delivered through video conferencing.

I think that video conferencing courses are good for electives that do not require a lot of interaction. French has a lot of interaction, lots of talking. I think that it could be good for History or English.

Student Limitations with Video Conferencing:

Participants also identified limitations to using video conferencing for student learning. As students are left alone in remote classrooms, most felt that video conferencing courses should not be used to deliver courses to younger students.

I found that the students in these courses were very responsible as they are senior students. I would not want to put the younger kids in there; for example, kids who are taking grade 10 courses.

Others felt that video conferencing courses are only suitable for motivated students. Students who require more assistance with learning new materials, or those with learning disabilities, would not feel comfortable taking video conferencing courses. This is partly because students must be self-driven to learn new material.

I think that only very good, motivated students can take video conferencing courses. This includes those students who need the courses to apply for college or university, and there is no other way of taking the course. Then they can study on their own and try to pass the course. However, video conferencing may not be suitable for regular students or students with learning problems.

Some students may lack the skills and parental support to engage in video conferencing courses. For example, students must be computer literate in order to e-mail any questions or assignments to teachers. Finally, participants felt that students were self-conscious and distracted about appearing on screen.

I found that even if the cameras are small, some students may have felt self-conscious. For this reason, some may have dropped out.

Technical Problems:

A range of technical problems posed significant challenges for the use of video conferencing. For example, communication is not always instantaneous. There are delays in the reception of responses between participants in different locations.

We had a video conferencing experience with UNBC a couple of years ago. It was kind of a successful experience, but it was difficult at the same time. It was difficult because of a delay in the broadcast. I said "good morning" and I waited, waited and waited. Then she said, "good morning"….and maybe in her window would be a message or delay for my response. It was hard to conduct a conversation because there was a long wait between responses.

Three people from UNBC and about six people representing the committee in McBride participated in the video conference meeting. It was difficult for the six people to ask a question when we started. One person started and the others had to wait for the answer because of the slow connection. We had to take turns to talk.

Participants felt that delays in responses may be due to the quality or speed of the on-line connection in McBride. Internet connections must be compatible between video conferencing partners. Sometimes video conferencing courses or meetings were interrupted as the connection was lost.

I use the smart boards. The kids like them, but sometimes the smart boards are not working properly because of some connection problems.

Some participants felt that the sound quality could be improved. There were difficulties knowing when technical problems would arise in remote sites. For example, teachers were unaware when speakers / microphones in remote sites were mute. In video conferencing courses, there were also technical problems with the camera that made it difficult for students to see the teacher. The resolution of TVs or screens also made it difficult for students to view the host teacher.

Technical Support:

Participants frequently talked about the limited technical support that was available to successfully support the use of video conference technology for education and community capacity building. Prior to the commencement of video conferencing courses, no technical staff were available to properly set up and test the equipment. Support to train and support both teachers and students to use and trouble shoot problems associated with video conferencing was a key recommendation made by participants. This is particularly important as students are often alone in a remote video conferencing site.

When problems emerged in video conferencing courses, most participants told us that the only option was to contact the principal at McBride Secondary School who provided them with technical advice. However, participants expressed that it was not advisable to rely on busy administrators who have mounting duties to provide technical support for video conferencing courses. In some cases, technical support was provided in Prince George; however, the technicians only visited the school two days per week.

Frequently, we need a technician or a computer person. We have one at the school but he comes here only for two days a week. So when he was not at the school a few times, we had real problems. We couldn't hook up for any reason.

Outside of these visits, teachers were required to contact the principal at McBride Secondary School if any problems emerged. Furthermore, there were no local technicians in McBride to support the use of video conferencing technology in other community capacity building initiatives such as employment training.

In addition to technical support, the provision of a teaching assistant to support student development in video conferencing courses was explored. Teaching assistants were only assigned to larger classes in Prince George. However, when TAs were assigned to provide support, the motives were not driven by educational needs. Instead, the motives were driven by concerns about protecting equipment investments.

Concerns were also expressed about assigning TAs to small groups of students in video conferencing courses because it would add costs and reduce the cost efficiency benefits of using such technology.

They had a teaching assistant who worked with the students on an essay. When you do that, you lose the efficiency if you start putting teachers in every room with small groups. Our numbers are pretty small. If there are more than 10 in a group, I would put a teaching assistant with that group.

Interest in the provision of TAs or tutors was expressed by service providers outside of the education sector. One participant felt that tutors are also needed to address general computer literacy needs that would provide a foundation for widespread adoption of video conferencing techniques in employment training and testing.

Infrastructure Support:

Participants identified a range of infrastructure needs that were deemed to be critical to deliver video conference courses. For the most part, each of the participating sites was equipped with a small room with video conferencing equipment and a screen to view the host site. In some cases, white boards or smart boards were used. During some years, video conferencing rooms were set up with computers and Internet access. Assignments were delivered through fax or e-mail. However, video conference settings were not always equipped with sufficient equipment to support the delivery of these courses. In response, teachers shared their experiences about how they found alternative ways to share teaching materials with their students.

I e-mailed them too. I tried that instead of faxing. They had a printer in the room one year, so it was good. Otherwise, the students had to go to the library and print. I requested this access for the students to be able to print. I cannot imagine doing this without e-mail.

When they told me that I will be teaching a video conferencing course, I prepared my courses with my computer. I knew that there would be computers in the video conferencing room. I thought that I could have my lessons on-line, but they told me that they did not have computers. I e-mailed my week's lesson to the secretary and she printed them.

When teachers sought to improve their ability to deliver these courses, they faced many obstacles in acquiring supportive infrastructure, indicating that there was a lack of resources and planning allocated to design and implement these courses.

We needed the fax machine and the printer in the room, because it was the only way that the kids in McBride could send their quizzes and assignments. If there was going to be a video conferencing course, this kind of support and equipment was needed.

Planning:

Previous researchers have underscored the importance of planning to successfully support and sustain the long-term use of video conferencing technology in education and community capacity building initiatives. Planning activities help users to anticipate or correct problems, as well as to implement activities smoothly. Planning also helps to ensure that sufficient resources are allocated to support video conferencing activities. Unfortunately, participants generally felt that there was a lack of planning for the use of video conferencing technology. In the case of the pilot project between the secondary schools in McBride and Prince George, a general agreement was reached only about which courses would be delivered through this medium. Discussions concerning the distribution of financial resources to cover costs in each site did not take place.

When we started this project, we agreed that Kelly Road would deliver one course, McBride Secondary School would deliver one course, and PGSS would deliver one course. We did not exchange any money. We only talked about the courses. We did not say, "okay you are teaching five of my kids and it is going to cost five times the amount in dollars". We never did that. We just had an agreement. If we all deliver our agreed courses, we are part of the pool. It does not matter if there is only one kid or seven kids.

We cannot deliver all the classes that we have to other schools because they will never pay for it. It would cost too much money.

There was a lack of consideration for the additional time required to incorporate video conferencing into organizational activities. For example, additional time was required to plan lessons delivered through video conferencing as teachers would send and receive quizzes and assignments by fax. Concessions were not granted to teachers who requested additional support to plan and prepare video conferencing courses.

A lot of time was needed to prepare the courses. There was a lot of equipment that teachers needed to know how to use, such as the camera; but there was no support for these things.

For community groups, time is required to organize video conferencing sessions with other groups. This includes additional time required to arrive at sessions early to do quality checks with the video conferencing equipment.

Lack of Partners:

The success of video conferencing in education and community capacity building initiatives depends on the ability to collaborate with partners in other locations. Some participants expressed difficulty finding other groups set up for video conferencing.

> *I think the only problem is if you use a video conferencing, who are you video conferencing with? If I want to video conference with someone else in the provincial government office in Prince George, and they don't have video conferencing equipment, we can't do it. It has to be in both places, someone else also has to have it.*

At times, partnerships were established without negotiating or exchanging financial contributions between institutions to sustain video conferencing courses. Such financial contributions may be determined by the number of students in a remote site taught by a host teacher.

Lack of Administrative Support:

With the exception of the principal at McBride Secondary School, participants felt that there was limited administrative support to address challenges associated with video conference courses at other partnering schools.

> *I wanted to talk about all of the challenges. No one asked us what the challenges were.*

Lack of Financial Support:

Some participants were asked to talk about the funding support that was allocated to the video conferencing pilot project. The Ministry of Education provided $75,000 through an e-learning grant. This enabled the participating schools to purchase computers and equipment. However, there was a lack of financial support to assist teachers to meet students in remote sites. Bringing remote students and teachers together was deemed to be important to build cohesion; to hear, experience, and address student concerns; and to obtain additional insights into student abilities and needs.

> *I think that kids in the same class must be together with the teacher at some point. It is essential. However, we did not have any support from the school to arrange trips to bring kids to this school.*

Participants also felt that there was a lack of financial support for acquiring equipment or developing alternative tools to support student learning.

No Promotion:

Finding multiple users can support the long-term viability of maintaining video conferencing technology within a community. Promotion is also necessary to reach out to potential partners. In McBride, participants felt that video conferencing capabilities and benefits need to be more widely promoted to potential users. Demonstration and training sessions could also be used to motivate interest in this technology.

> *One thing that we need to do more is to let people know that we have the video conferencing equipment at the hospital and at the high school. Especially at the high school, I do not know which other groups in the community use that. I think that we must promote it better. We need to teach them how it works. We must do a demonstration to motivate the interest in the technology. It could be used for some training with other institutions in Prince George. I think that the institutions that want to use it can pay the high school because it costs money. The use of the video conferencing is convenient and reduces the need to drive to have meetings outside of McBride, especially in the winter time.*

Participants also felt that students should be advised in advance that they are enrolling in a video conference course and provided with adequate information. Amongst the student population, wider knowledge and acceptance of video conferencing technology could be promoted through computer science courses.

Barriers to Using Other Web-Based Technology:

Key informants identified a range of tools used for communication including:

- e-mail,
- telephone calls,
- fax,
- teleconferencing,
- letters / mail,
- newspaper advertisements,
- newspaper stories,
- web pages,
- Internet (general), and
- CBC radio.

These tools were also used to promote and deliver services. For example, teachers provided examples about how alternative methods of communication were used to support the delivery of video conference courses.

> *Every student has an e-mail when they register. Also, we have electronic folders, and they can drop assignments to the teacher.*

> *I provided students with my e-mail address. In the first year, I had a blog for students to post there. It was very successful because they could post there also.*

Participants discussed challenges to using other web-based technologies to support student learning in video conference courses. For example, the development of student web pages on school websites were discontinued as the school needed to control the contents of any web pages that were created. Class web pages, however, would enable teachers to post tests on-line and to receive assignments from students. Posting recorded lessons on-line had been explored. However, it was determined that the files with sound recording would be too large to download and view. Others noted that they had not thought about incorporating other web-based technologies into student learning activities.

> *We thought that the students in the remote site could just log on and play the last session, but it did not work. It was too difficult to have on a web page. They felt that the files would be too much for the sound recording. Of course it could have been an excellent idea, but it did not happen.*

Evaluation:

No formal evaluations were conducted for video conferencing courses. Instead, basic informal discussions were held with students. Occasionally, teachers received feedback through student e-mails or blogs. One teacher noted that they travelled to visit remote students in McBride to discuss their experiences. However, no formal evaluation or report was ever completed and provided to the schools or the school district.

5.0 Summary of Recommendations

Recommendations from this study can be categorized into four themes:

1. Management (classroom support, validation, funding, and staff);
2. Delivery (classroom and blended learning);
3. Teacher Capacity (training and trends to improve, support, and fit student expectations); and
4. Student Capacity (support, roles, and expectations).

Management

Classroom support needs:

- Technical support for video conferencing classes to protect the quality of teaching and learning in the connected classrooms.
- Policies to provide incentives for teachers to pursue training for video conferencing and ICT.
- Compensation for the time teachers allocated to preparing and delivering video conference courses.

Evaluation needs:

- Participating schools should evaluate the results of video conferencing projects on an on-going basis through observations, testing of students, and through discussions with teachers, students, technical support, and other staff.
- Promote the use of evaluations for video conferencing courses.

Funding needs:

- Allocations to support the development of video conferencing courses.
- Teachers should receive appropriate support for extra duties associated with video conferencing classes.
- To set up video conferencing rooms that are suitable for remote classes.

Network needs:

- Establish page on the school district's website that provides appropriate information and resources for teachers, students, and parents involved in video conferencing courses. It should include practice guidelines, information related to the use of video conference technology, forums, a listing of technical reviews in northern BC, announcements of new technologies and updates, announcements of global video conferencing activities and opportunities, and recordings of video conference classes produced for students with a password to download when needed.
- Support community capacity building through the provision of forums and the development of curriculum around these medium.

Delivery

Classroom needs:

- Teaching assistants for larger classes, or particular course types, in remote sites.

Blended learning needs:

- Methods of delivery support for small classes in remote sites (1-5 students). This may include pre-recorded classes that are available for downloading on a CD or IPod.

Teacher Capacity

Training needs:

- Opportunities for teachers with experience in delivering video conferencing courses to share their knowledge with their colleagues about challenges and best practices.
- Provision of forums and training for teachers and staff.
- Creation of a mentor and support network for video conferencing teachers.

Trends to improve:

- Create opportunities for teachers to discuss common problems and responses to delivering courses through ICT with their colleagues. This should include best practices, experiments used with video conferencing technologies, and networks used to obtain training with video conferencing equipment.
- Provide literature on video conferencing.
- Encourage teachers to consider delivering one session in their traditional classes through video conferencing.

Support needs:

- Technical support to enhance students' skills with using video conferencing equipment in order to enhance the comfort levels that students have with using such equipment as a natural tool for learning.

Addressing student needs and expectations:

- Teachers should assess students' needs in all of the remote sites that they are delivering materials.
- Assess student feedback about video conferencing courses and develop strategies to increase collaborative and participatory work. Previous strategies have included e-mails, blogs, and face-to-face meetings to enhance communication between teachers and students.

Student Capacity

Support needs:

- Provide training on the use of video conferencing equipment to students who will be involved in video conferencing classes. Training sessions should include all of the participating parties involved in both the host and remote sites.

Roles:

- A mature student in a remote site may be designated and trained to be responsible for configuring, troubleshooting, producing, and operating the video conferencing equipment.

Expectations:

- Students should be advised that they are responsible for their own learning in video conferencing classes. Video conferencing is a distance education method that has an independent learning component, although it also promotes collaboration and participation with teachers and students in the host site.

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6.0 Useful Resources for Video Conferencing

Websites

Alberta Education. *Video Conferencing Research, Community of Practice Research Report*. Edmonton: Alberta Education. Website: http://www.vcalberta.ca/community/Research_Summary_Report_word_version_final.pdf.

> This report examines the use of video conferencing technology to deliver education in Fort Vermilion School Division No 52, Red Deer Catholic Regional Division No. 39, Grande Yellowhead Regional Division No. 35, Edmonton public schools, and Prairie Rose School Division No. 8. Key topics include technical support, coordination and delivery, incentives, mentoring and training, and research and evaluation of video conferencing techniques.

Alberta SuperNet. Website: http://www.albertasupernet.ca

> Provides high-speed connectivity for Alberta's public sector institutions including schools, libraries, health facilities, and government offices. Construction on the SuperNet (a high-speed digital network linking 429 urban and rural communities throughout the province) began in 2002 and was completed in 2005.

British Educational Communications and Technology Agency. Website: http://becta.org.uk

> Established in 1998, BECTA's mandate is to promote the innovative use of technology to facilitate learning in the UK. This includes initiatives to provide teachers and parents with support to get children learning online, the role of leadership in implementing technology in education and training, and descriptions / evaluation of various types of video conferencing systems.

North Slope Borough School District. Website: http://www.nsbsd.org

> The North Slope Borough School District in Barrow, Alaska started using video conferencing in 1993 in order to deliver education to students of diverse cultures in outlying villages in order to prepare them to work and live in the information age.

The Institute for Distance and Distributed Learning at Virginia Tech. Website: http://iddl.vt.edu/instructors/ivc/before.php

> Provides tips for teaching through video conferencing (i.e. dress codes for instructors, camera use, how to prepare powerpoint presentations, classroom management).

The Learning and Teaching Scotland Video Conference Hub (VC Hub). Website: http://www.ltscotland.org.uk.

> This Website demonstrates the use of various technologies (i.e. video conferencing, podcasts, online magazines, etc.) to deliver education to students, as well as information about teaching support and funding / cost savings programs for software and equipment.

University of Alaska – Office of Information Technology. Website: http://www.alaska.edu/oit/vcs/etiquette/etiquette.xml

> This Website provides information about setting up and using video conferencing equipment (i.e. camera placement, lighting, equipment checks, how to dial out, how to receive calls, how to schedule video conferencing sessions, reducing noise, dress codes, etc.).

University of British Columbia – Faculty of Medicine. Website: http://www.med.ubc.ca/education/distributed_programs/mpaact/etiquette_training.htm

> This Website provides information about video conferencing etiquette and training. Video conferencing tips focus on strategies for interacting with remote site participants (i.e. use of gestures, dress codes, time management, managing group sessions, design of presentations, etc.).

University of California – Cooperative Extension. Website: http://groups.ucanr.org/VC/Video_Conferencing_Etiquette_and_Tips/

> This Website provides tips for managing meetings through video conferencing (i.e. scheduling video conferencing sessions / troubleshooting technical problems). There are also several links to other universities in the United States that provide video conferencing tips on topics such as setting up video conferencing equipment, how to call and answer remote sites, and troubleshooting technical problems.

University of Victoria. Website: http://imp.uvic.ca/faculty/documents/etiquette.PDF

> This Website provides a link to a document with tips and etiquettes for tutors working with video conferencing related to the sound (voice and noise), presentation materials, timing (arriving and leaving the room), and camera movements.

University of Washington – How to Videos. Website: http://www.uwtvproduction.org/resources/prodvideos.html

> "The Video Conference Zone" is a video clip that viewers can download from the UWTV Production website. It demonstrates good video conference techniques, as well as some common problems and how to avoid them.

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