

KWIK

Know When I Know and Know What I Know:

A Nova Scotia Advanced Networks Educational Videoconferencing Project

Spring 2005

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The long-term societal implications of reshaping access for individuals, communities, organisations, nations and regions across the world are of major significance, but are not predetermined by the technology. Instead, they will unfold over time through the complex interplay among the many actors, participating in many arenas, who shape these outcomes through a wide range of social, policy and technical choices, some as simple as whether or not to go online.

Dutton, Gillett, McKnight and Peltu, 2003

Executive Summary

The KWIK six week pilot project (Know When I Know, Know What I Know) was an opportunity for rural Nova Scotia Western Valley students to gain access to an expanded range of expertise and educational programs without leaving their schools. By exploring educational delivery using a high-speed fibre optic network and video conferencing equipment, students at two test-site schools participated in a gamut of enhanced learning opportunities limited only by the school year and the availability of experts willing to instruct. The participation of Acadia University and the enthusiasm of the faculty members there contributed significantly to the overall success of the project. In fact, the initiative demonstrated that students and educators are ready to champion more creative and auspicious approaches to educational programming.

The project was founded on the success of two projects occurring in different jurisdictions of the province of Nova Scotia. Acadia University in Wolfville had developed an innovative software program called MusicPath that enables a piano to be played remotely over an Internet connection. This holds tremendous potential for conducting piano lessons in rural outlying areas that may not have the availability of experienced piano teachers. The Western Valley region (Annapolis and Digby Counties) through the leadership of the Western Valley Development Agency (WVDA) had just completed the building of a 145 km community owned and managed fibre optic network referred to as Fundyweb. The Fundyweb Board had the resources to connect two regional high schools - St. Mary's Bay Academy and Bridgetown Regional High. The high speed network provided the necessary infrastructure to enable program enhancement at rural schools; of particular relevance to schools with declining population and corresponding declining operational budgets. The partners formulated the idea of offering enhanced music programs to the rural schools, with the hope that other topics of interest would surface and be delivered via videoconferencing.

The next important step in the project was to ensure there was interest at the high schools. This required staff champions to work with Acadia to coordinate subject matter and scheduling. This was **not** a daunting task as both principals and teachers at the schools were forward thinking, and wanted to explore new avenues of program delivery. When students were polled to assess their interest they were very enthused about the music programming, biology, and chemistry. Additionally, communicating using technology is very much part of their culture, and they embraced the methodology. Allowing the students' input to the project's educational content encouraged their participation.

"The general feedback from students was very positive and they looked forward to the presentations. They felt it was a good way for them to see people working within a specialized area and to get a feel for the possibilities that await them.

Thanks for everything, I hope that this project is a success and we will be doing more business next year!!!"

Jeannie Montgomery, faculty, Bridgetown Regional High

Project Purposes

The dual purposes of the KWIK project were to provide instruction to two rural schools and to capture feedback about the provision of that instruction. Starting with a short term (six week) pilot gave time to assess the project and to reflect on the next steps.

The short term goals were accomplished between May 4 and June 10, 2005. The environment to achieve long term goals has been established through the technology investment and will be encouraged for the Fall of 2005.

Short term goals

1. To link Acadia University with two rural Nova Scotia schools through advanced networks for mutually beneficial interactions
2. To document the effects of videoconferencing in teaching and learning
3. To identify potential ongoing cost-saving parameters
4. To provide the opportunity for schools to substantially increase their bandwidth for exploration of innovative approaches to education.

Long term goals

1. To interconnect Nova Scotia schools with CA*Net 4 for further interactions with other learning networks
2. To demonstrate community economic impact of advanced connectivity networks
3. To identify best practice university/school shared opportunities over networks
4. To interconnect schools with each other for creative learning opportunities

Overview

As described in the executive summary, the pilot project was mainly supported through donated time, talents and equipment. In addition, the Nova Scotia Office of Economic Development provided \$10,000 in funding that covered the costs of school switch equipment, part-time faculty and production of the report and video documentary. Each of the institutions willingly contributed long hours of staff time at no charge to the project. The partners and contributions are described in Appendix A.

After initial discussions in February 2005, the partners decided to provide a proof of concept demonstration. Biology students from the high schools were invited to “sit in” on Honours Biology student thesis presentations from the Acadia University campus. Because the school wiring was not yet in place, the high school students were bused to the Cornwallis and the Middleton centres to watch the lectures and interact with the remote presenters.

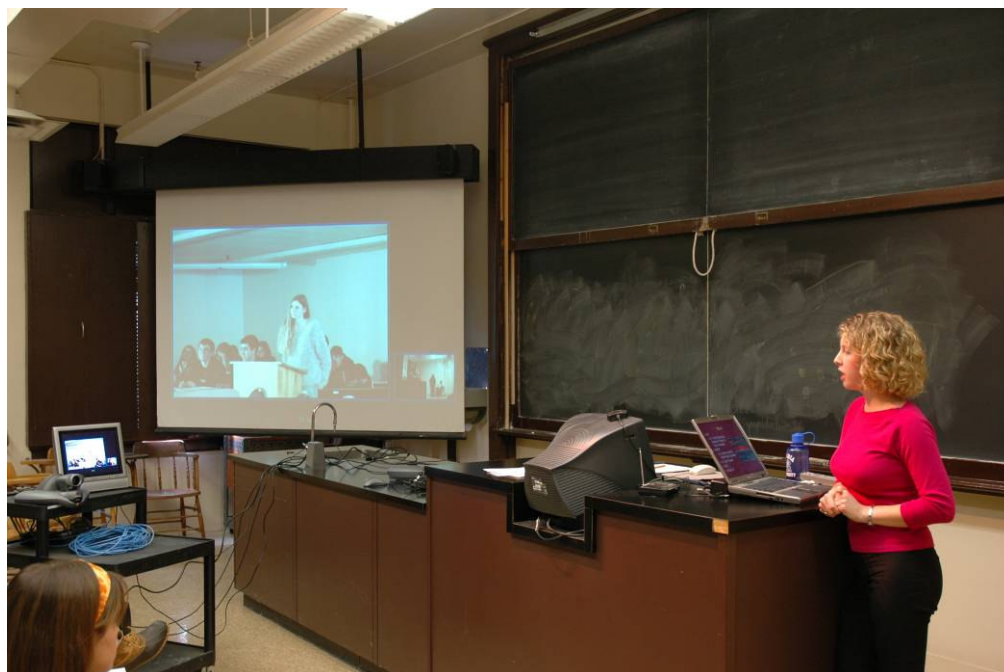


Figure 1 – Acadia Biology Honours student Christien Cormier, on the Acadia campus, answers questions from a Bridgetown High School student in Middleton in the February 16 session.

The first lesson on May 4, 2005 after connecting the rural schools was a drum lesson between Acadia professor Mark Adam and the Bridgetown High School. Student Jacob Meisner exhibited his enthusiasm by making himself available at 8:15 AM for six weeks to participate in these lessons. One observer indicated that he was surprised at the high level of interactivity between student and teacher.

Professor Eugene Cormier's classical guitar lesson with St. Mary's Bay Academy (SMBA) started on the afternoon of the same day. He spoke with a mixed level group of students about the background of classical guitar and played a short piece. Following his demonstration there was a short moment of silence, followed by applause interspersed with exclamations of "Way cool!" from the students.

While various scheduling difficulties prevented delivery of the Calculus lecture, Math Professor Jeff Hooper watched the drum lesson and hopes to work with the schools in the Fall of 2005. Prof. Hooper remarked that also using videoconferencing to meet with his research colleague in London would remove travel costs and enhance his research, all without any additional charges because the network and videoconferencing are in place.

A full list of the timelines and sessions is provided in Appendix B

There were two types of chemistry lessons. Prof. Greg McKinnon gave a PowerPoint Chemistry lecture to SMBA. In the Chemistry lab led by Dr. John Roscoe, instruments inserted in the beaker measured chemical reactions, and the resulting graph was displayed to the remote students. Students watched a combination of the creation of the chemical reaction graph and the changing colours of the chemical reaction displayed in the beaker, all through the videoconference system.



Figure 2 – Dr. John Roscoe in an Acadia University Chemistry lab speaks with St. Mary's Bay Academy students in Weymouth while Acadia Production Manager Dave Sheehan films the presentation.

The Biology Lab presented by Dr. Dave Kristie to the Bridgetown students was a combination of lecture and microscopic discovery. Two different microscopes were connected via notebook computer to the videoconference unit so that the students could view the magnified flowers and cells as though they were looking through the microscope.

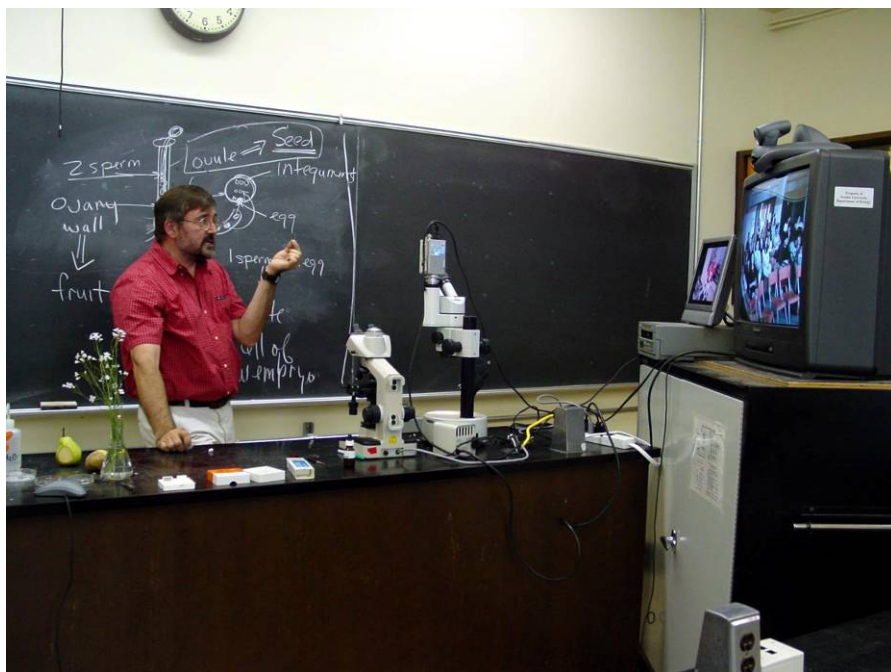


Figure 3 – Dr. Dave Kristie interacts with St. Mary's Bay Academy high school Biology students. The microscopes were connected so that the remote students could see the magnified specimens.

A final session saw a group of students in a question and answer interaction with several Acadia University staff members. The intent of the life skills session was to help student think through concerns that might arise after high school graduation about university, college o work world issues.

Different sessions were filmed through the multimedia area of the Acadia Institute of Teaching and Technology, with a video documentary produced that supplements this report.

Successes

- 1. School access remains in place**
Because of the generosity of the Western Valley Development Agency and the Fundyweb Broadband board, the wiring and the videoconference equipment remain and can be used in the upcoming years.
- 2. Direct University/School relationship initiated**
A University/School relationship has been established at the level of content provision.
- 3. Student/teacher enthusiasm high**
The teachers reported enthusiasm from the students. Eugene Cormier reported that after a few lessons and some discussions about what university music programs are like, the high school students said that they would like to come to Acadia to take some courses.
- 4. Different types of interaction explored**
The lessons ranged from individual to group lessons and from lecture to lab, so there was a good initial cross-section of teaching examples. It appeared that the lessons with the highest amount of interaction were the best.
- 5. High Schools trained in equipment use**
The WVDA staff provided initial technical help and staff training. This help was essential to the ongoing operation of the lessons.
- 6. University setups and support mechanisms tested**
The six consecutive drum lessons and guitar lessons provided a forum for experimentation in teaching delivery. Placement of the microphone, the type of microphone, the screen size and the room size were all factors in the lesson satisfaction. Prior to this project, none of the Acadia faculty project volunteers had used videoconferencing equipment, so it was a learning experience for them and for the staff that supported them. For the ongoing lessons, the professors were most comfortable controlling the cameras themselves and were left on their own with the remote control once setup was completed.
- 7. Network issues overcome**
The first week of videoconferencing sessions had some “frame freezing” that interfered with the flow of the interaction. Those problems were tracked to a telecommunications carrier router problem. Once the router firmware was updated, the lessons ran smoothly.

Challenges

1. Interaction protocol

While one-to-one instruction worked very well, interaction with a whole classroom became a challenge unless the remote class was presented to the instructor on a large screen. If 5 students answer a question, the instructor sometimes cannot pinpoint the source of the answer. More investigation is needed.

2. Feedback sparse

A web site was created to capture the feedback from students, teachers and observers. While you can lead a participant to a web site, you can't necessarily make them answer the questions! There were only 26 responses to the survey, so our feedback was limited.

3. Better scheduling mechanism needed

The scheduling consisted of a series of emails and phone calls with teachers in the high schools, discussing type of lessons, instructors in the Acadia campus and Acadia rooms and equipment. For ongoing interaction, a better scheduling method needs to be explored.

4. Matching student needs, expertise availability and timing

The six week pilot project gave little time to explore what the teachers needed, what excited the students and when/how to train Acadia professors in using the new technology. The next project should allow more lead time to match available expertise with students and teachers.

5. Peer pressure

While a number of students sat in on the guitar lessons, the guitar instructors chose to teach by one on one interaction with a lead student. There was some concern that this may have put extra pressure on the lead student in performing in front of his peers.

6. Setup overhead

While network connections in every classroom at Acadia allows the videoconference equipment to be set up in many locations, the physical transportation means more overhead for the classroom setup. It may be better to designate a few rooms at Acadia where some equipment could remain set up, or investigate a better transport mechanism.

7. Rhythm

There is enough of a delay built into the videoconferencing units that when the Acadia instructor counts the beat for the remote student he is unable to successfully "count him in" and maintain the rhythm. The instructors overcame this challenge by starting the rhythm and then asking the student or remote teacher to remotely start the count before the student plays.

Observations

1. Formal research needed

The next phase of the project should have a formal research and evaluation plan in addition to simple interviews. This will capture the data needed to allow schools to make informed decisions about investing in the technology.

2. Classroom pedagogy protocol training needed

Lessons will be more effective if the students, teachers and facilitators are aware of how best to interact using videoconferencing. This will be a learning process for all and should develop over the next year. At a minimum, teachers interacting with large groups should begin every class by asking “Can you see me clearly? Can you hear me?” and by suggesting “Please raise your hand if you have an answer.”

3. Feedback was generally positive

Although only 26 project participants completed the web survey, the ratings of the sessions were generally high, averaging consistently at 4 or above out of a high score of 5 (other than the first session that had video problems).

4. Support for further interaction

Principals, teacher, students and Acadia faculty members have all suggested that they would like to continue this in fall of 2005. What form this will take depends, in part, on participation at all levels - universities, schools, school boards and the provincial Department of Education.

The future possibilities

Dr. Leo Elshof, a professor in Acadia’s School of Education, has considered how videoconferencing could be effectively used in schools and describes several exciting possibilities. He suggests that a weekly or bi-weekly science show brought to the schools via videoconference would allow students to ask questions and interact with scientists, building up relationships. Combining web-based learning and videoconferencing from a campus outreach centre could supplement the standard curriculum.

MusicPath is poised to be used in schools and music lessons could easily be available in the remote communities.

Sustainability

While the initial KWIK project setup costs have been covered, the schools will achieve maximum ongoing benefit through an organized approach – research of benefits, organizing training for in-school support, identifying the opportunities to bring expertise into the classroom using videoconferencing.

The Ontario and Alberta schools provide several school videoconferencing support models. A teacher complement could be shared between schools so possibly a music teacher could work out of one school and teach to another school using videoconferencing. Some schools encourage a lead teacher to become a videoconference support expert for a region by providing release days with a substitute in the classroom. In some cases, designated students are trained and provide technical classroom support.

Where schools serve as community meeting places, delivery of distance education courses in after-school hours could provide revenue to the school for videoconference support.

Budgets for Advanced Placement programs in the schools could be used to enable long distance connections. Through these funds, one calculus teacher could teach multiple schools at one time and would not need to be reimbursed for travel.

Possible long term funding sources

1. *Schools*: part-time teaching fund and IT support fund
2. *School board*: Teaching and Advanced Placement funds
3. *Community*: Distance Education course fees
4. *University*: Enrolment management
5. *Provincial*: Ongoing program funds from the Department of Education
6. *Other*: Utilization and support through fees from other public service institutions

Potential benefits

There are many potential benefits of having videoconferencing in the Nova Scotia school system.

1. Students could “sit in on” university-level classes or interact with business or research experts from anywhere in the world without a per-minute surcharge applicable using videoconferencing over regular telephone hook-ups (ISDN).
2. Sharing scarce teaching resources between schools at any connected location (such as Math/French immersion or Music teaching) using school-to-school videoconferencing.
3. School Advanced Placement and “Options and Opportunities” programs could benefit from access to experts across the world.
4. Universities have a chance to “meet” high school students and answer questions about university life.

5. Nova Scotia schools have opportunities for access to the same videoconference opportunities as other Canadian schools (Alberta, Quebec and Ontario).
6. Videoconferencing opens up low-cost access for community distance education opportunities for rural communities in the schools.
7. Teacher professional development in multi-media could be provided by groups such as the Acadia Institute for Teaching and Technology on a just-in-time basis at the schools without travel for the teachers or trainers.
8. High school students could be trained along with teachers to use the videoconference equipment and could potentially earn wages operating the equipment outside of the regular classroom.
9. Videoconference equipment could be used to connect with other communities for other events (political speeches, symphony orchestras, community discussions).
10. Student teacher practicum observation may be possible.

Recommendations

With the groundwork in place, additional funding over the 2005-2006 school year would enable five critical steps forward.

1. Establish a full study of the videoconferencing in the Nova Scotia schools.
2. Provide additional in-school videoconference equipment training for teachers and students.
3. Work with the schools to bring Advanced Placement expertise into the schools using videoconferencing.
4. Enable Bachelor of Education students to use videoconferencing in their classroom experience.
5. Make professional development training available to teachers in the schools using videoconferencing.

Conclusions

The ABEL (Advanced Broadband Enabled Learning) University/School videoconferencing program based in Ontario and Alberta reaches into multiple K-12 classrooms in those provinces. Small school programs are being enriched with additional course delivery from larger schools using classroom videoconferencing. Education budgets are tight and programs such as Advanced Placement and Options and Opportunities need cost-effective solutions.

Simply setting up additional technology in a school will not make a difference. Rather, it will be the combined teacher/student champions using the technology that will change course delivery and expand opportunities. Investment should be targeted for schools that identify local champions.

In rural regions, student enrollment tends to be low and budgets which are derived from enrollment are then disadvantaged when compared to larger urban schools. The advent of the Fundyweb and other similar broadband initiatives will prove, over time, and with support of visionary stakeholders, to equalize educational programming for students regardless of where they reside. The continued participation of progressive universities such as Acadia, and innovative organizations like the Western Valley Development Agency could in fact expand the offerings available to students, bringing them more specialized curriculum that could encourage entrepreneurship, more exploration in science and technology, and a greater understanding of the arts. The removal of distance barriers through the creative use of broadband could further enable programs already targeted as priorities in the Nova Scotia educational system.

Appendix A – Partners and Contributions

Partners

- Acadia University
- Western Valley Development Agency
- Fundyweb Broadband Board
- NS Office of Economic Development
- Bridgetown Regional High
- St. Mary's Bay Academy

Contributions of Partners

- Program Coordination / web services/instruction
- Video Conferencing units /technical support / training
- Lateral cables and entrance cables to connect schools
- Electronic equipment/video documentary/report
- Keen Interest/session scheduling/student participants
- Keen Interest/session scheduling/student participants

Program components

1. Engineering of school connections
2. Building lateral cables to connect schools to the Fundyweb
3. Procurement and installation of electronic switching equipment to *light-up* school connections.
4. Development of course material and scheduling of delivery
5. Training for teaching staff and students on operation of Video Conferencing equipment.
6. Development and delivery of programs from Acadia.
7. Video documentation of six-week pilot project.

Project Budget

	Cost
Partnership contribution estimates	
Laterals and entrance cables (Fundyweb)	25,678
Survey hosting (Acadia)	400
Videoconferencing units(WVDA) ¹	56,000
Coordinating & planning time (all partners)	5,000
Volunteer preparation, testing and session time	2,000
Videoconferencing technical setup and support	2,000
Total Partner contributions	\$91,078
Funding from Economic Development	
Part-time faculty salaries	500
KWIK trademark costs	305
Report production costs	400
Video Documentary	4,140
DVD production	500
Report distribution costs	100
Switching equipment & engineering fees	4,055
Total from Economic Development	10,000

There is an ongoing annual maintenance fee for each school connection at a rate of \$255.13.

¹ Videoconference equipment at today's prices would be considerably less.

Appendix B – Timeline and Sessions

Program Timeline

Initial Meeting with schools to gauge interest	February 9, 2005
Proof of concept Biology presentation	February 16, 2005
Secure funding for project	March 15, 2005
Completion of the connections to the FUNDYweb	April 18, 2005
First planning meeting over video conferencing	April 27, 2005
First session delivered from Acadia to students	May 4, 2005
Program wrap-up sessions	June 10, 2005

Pilot Program Curriculum Delivery Schedule

Date	Time	Location(s)	Instructor	Content	Type
4-May	8:15	BRHS	Mark Adam	Drum	Single
4-May	3:30	SMBA	Eugene Cormier	Guitar	Group
11-May	3:30	SMBA	Eugene Cormier	Guitar	Group
11-May	8:15	BRHS	Mark Adam	Drum	Single
18-May	8:15	BRHS & SMBA	Mark Adam	Drum	Single & Group
18-May	3:30	SMBA	Eugene Cormier	Guitar	Single & group
24-May	11:25 - 12:25	SMBA	John Roscoe	Chemistry Lab	Group
25-May	8:15	BRHS	Mark Adam	Drum	Single & group
25-May	3:30 PM	SMBA	Eugene Cormier	Guitar	Single & Group
26-May	11:25-12:25	SMBA	Greg MacKinnon	Chemistry lecture	In-class
31-May	1:10 to 2:10	SMBA	Kimberley Webb	Toolbox tour	Group
1-Jun	8:15	BRHS	Mark Adam	Drum lesson	Single
1-Jun	3:30	SMBA	Eugene Cormier	Guitar	Single
8-Jun	8:15	BRHS	Mark Adam	Drum lesson	Single
8-Jun	3:30	SMBA	Eugene Cormier	Guitar	Single
10-Jun	1:00-2:00	BRHS	Dave Kristie	Biology Lab	

Although Acadia was the sole university engaged for this project, the momentum that occurred there could logically be experienced through any other higher educational institute in Nova Scotia, Canada, or around the world. Canada's National Research Network (CA*net4) provides the catalyst for a connection providing many educational resources for students to expand their learning experiences. The challenge will be to rally the appropriate partners, educators, and champions to recognize the tremendous potential that could build on this innovative pilot project.

Appendix C – Comments and feedback

“2003-2004 was the first year that music was offered to the junior high students in our area. Our program is still in the early stages of development so this pilot project has helped improve our program.”

- Doris Fraser, Principal, St. Mary’s Bay Academy

“Most homes outside of the town do NOT have access to high speed Internet. Our low enrollment means that we have bare bones curriculum.”

- Orris Orlando, Principal, Bridgetown Regional High School

“I liked the teacher, he was very laid back. It was also very neat to do this with someone who was in another place.”

- Jacob Meisner, student, on his first drum lesson with Mark Adam

“The ability for my student to have a world class musician teach him about percussion techniques was awesome. The opportunity for enhancing the curriculum is amazing. For a rural school like ours to finally have the access to the larger world is amazing.”

- Mark Bezanson, teacher, Bridgetown Regional High School, on the first drum lesson

“Instructor enthusiasm and quality of instruction was marvelous; the student appreciation level was high and interaction was wonderful.”

- Observer, Guitar lesson

“I wanted to say a big thank you to your panel for the great job done. It was well received by the students and has served as a springboard for later discussions.

I will want to be involved in another toolbox presentation next school year with a different bunch of students.”

- Jennifer Thibault, teacher, Bridgetown Regional High, on the group life skills session

“It was a really great experience. Hopefully we can continue with this next year.”

- Mark Bezanson, teacher, Bridgetown Regional High School, on the whole project

“There was a lot of interest...quite a few kids wanted to sign up.”

- Stephen Fischetto - student - St Mary's Bay

“... it operated as seamlessly as if I were the instructor in the room and yet the instructor was hundreds of kilometres away at Acadia.”

- Jennifer Thibault, teacher, St. Mary's Bay Academy

“The KWIK project shows the potential of more strongly connecting Nova Scotia universities to our high schools by allowing our best professors to share their expertise in classrooms across the province. This kind of collaboration can significantly strengthen our provincial education system as a whole and allow us to make much better use of our resources.”

- Jennifer Bolt, Director, AITT

Appendix D – Press coverage

Newspaper

Lonergan, Patricia. “Video conferencing enhances education” The Spectator Feb. 22, 2005

Lonergan, Patricia. “Technology brings students together” Digby Courier Feb. 23, 2005

Cooper, Anthony. “Remote learners tap into Internet” The Chronicle Herald Jun. 16, 2005: B5

Elliott, Wendy. “Pilot provides new model for course delivery” The Regional Magazine Jun. 28, 2005

Radio

June 17, 2005 - Radio Canada; Danielle Marchand