The effectiveness of web-delivered learning with aboriginal students: Findings from a study in coastal Labrador

David Philpott
Dennis Sharpe
Rose Neville

Authors

David Philpott is an Associate Professor of Education at Memorial University of Newfoundland. Correspondence regarding this article can be sent to: philpott@mun.ca

Dennis Sharpe is Professor of Education at Memorial University of Newfoundland.

Rose Neville is a PhD student in Education at Memorial University of Newfoundland.

Abstract

   This paper outlines the findings of a study that explores perspectives of e-learning[i] for aboriginal students in five coastal communities in Labrador, Canada. The rural nature of many communities in the province of Newfoundland and Labrador, coupled with a dramatically declining enrollment, has resulted in expanding use of e-learning as a means to provide quality high school curriculum. Recently, a Community University Research Alliance partnered with stakeholders to explore the success of e-learning in the province. Through one of the projects of this alliance, the authors examined the success of this mode of delivery for aboriginal students from the perspective of the students themselves, as well as the perspective of parents and educators. Additionally, student performance was examined in comparison to provincial peers. A wealth of data emerged which affords insights into factors that support and hinder e-learning in coastal areas and also informs educators about the diverse learning characteristics and needs of aboriginal students. As Canadian educators are increasingly challenged to address achievement issues that continue to characterize aboriginal populations, this study offers important data on the viability of e-learning as a mode of curriculum delivery.

Résumé

   Cet article présente les résultats d'une étude qui explore les perspectives de l'apprentissage en ligne pour les élèves autochtones dans cinq collectivités côtières du Labrador, Canada. Le caractère rural d'un grand nombre de collectivités de la province de Terre-Neuve-et-Labrador, jumelé à une baisse spectaculaire de la scolarisation, a mené à une utilisation accrue de l'apprentissage en ligne comme solution permettant d'assurer un curriculum de qualité au secondaire. Récemment, une alliance de recherche université-communauté a travaillé de pair avec les intervenants afin d'étudier les résultats de l'apprentissage en ligne dans la province. Grâce à l'un des projets de cette alliance,

les auteurs ont examiné le succès de ce mode de prestation auprès d'élèves autochtones du point de vue des élèves eux-mêmes, ainsi que du point de vue de leurs parents et de leurs éducateurs. En outre, le rendement des élèves a été comparé à celui de leurs pairs au niveau de la province. Une foule de données en sont ressorties, ce qui permet de mieux comprendre les facteurs qui favorisent et qui entravent l'apprentissage en ligne dans les zones côtières; ces données informent également les éducateurs sur la diversité des caractéristiques et des besoins d'apprentissage des élèves autochtones. Les éducateurs canadiens sont de plus en plus mis au défi de trouver un moyen de surmonter les problèmes de réussite scolaire qui continuent de caractériser les populations autochtones, et cette étude leur fournit des données importantes sur la viabilité de l'apprentissage en ligne comme mode de prestation du curriculum.

Introduction

Education in the province of Newfoundland and Labrador (NL) is characterized by a dramatically falling school population in a predominantly rural society. In 1987 the province operated 621 schools for 136,228 students. Today there are 280 schools for only 72,084 students (Department of Education, 2008). The resultant challenges to the delivery of quality education are significant, especially in Labrador which is characterized by harsh geography and significant cultural/linguistic diversity. In 2007/8, the Labrador School District (LSD) serviced 3,720 students enrolled in 16 schools, down dramatically from 1990 when there were 7,563 students in 40 schools (Department of Education, 1990/2008). The LSD student population is also the most culturally and linguistically diverse in the province with at least three separate aboriginal groups in Labrador (Innu, Inuit, Métis) spread among equally diverse and often small, isolated communities. The region consistently places in the lower performance ranges across subject areas in comparison to their provincial counterparts in annual assessments (Department of Education, 2000/2007). In 2003 the *International Adult Literacy and Skills Survey* placed the region below the national average in all areas of literacy (Statistics Canada, 2003a). More recently, the 2007 *Program for International Student Assessment* (PISA), (Statistics Canada, 2006) identifies NL and, in particular rural and aboriginal students, as continuing to consistently perform below average ranges in achievement. Data also links lower literacy levels with unemployment, underemployment and low income – fueling a cycle that can become difficult to break (Statistics Canada, 2003b).

Specific data on the performance of one group of aboriginal students in the region emerged from an in-depth report on the educational needs of the Innu of Labrador. Philpott, Nesbit, Cahill and Jeffery (2004) raised significant concern about alarming rates of attendance, achievement and graduation among the Innu of Labrador. Their report identified that despite having average cognitive ability, one third of Innu youth do not attend school at all; among those who do attend school, students begin dropping out in primary school with overall attendance rates at approximately 50%. Achievement is equally disturbing in that "56% of seven year olds are one to two years behind and 100% of 15 year olds are at least five years behind" (Philpott et al., 2004, p.15). Clearly, we need to investigate means and methods to enhance educational opportunity for these youth.

However, concern for educational achievement of aboriginal youth is hardly unique to the Labrador region and is, in fact, well documented in Canada as a whole. A call for action was

articulated by the Council of Ministers of Education (2004), which stated:

> There is recognition in all educational jurisdictions that the achievement rates of aboriginal children, including the completion of secondary school, must be improved. Studies have shown that some of the factors contributing to this low level of academic achievement are that aboriginals in Canada have the lowest income and thus the highest rates of poverty, the highest rate of drop-outs from formal education, and the lowest health indicators of any group. (p. 22)

Likewise, the Office of the Auditor General (2004) questioned the effectiveness of current interventions by stating,

> We remain concerned that a significant education gap exists between First Nations people living on reserves and the Canadian population as a whole, and that the timeframe estimated to close this gap has increased slightly from about 27 to 28 years. (Sect.5.2)

Given Canada's shifting demographic base and a trend towards greater cultural diversity, these concerns become more significant. The 2006 census reported that over 200 languages are being spoken in this country and that "roughly one out of every five people in Canada, or between 19% and 23% of the nation's population, could be a member of a visible minority by 2017" (Statistics Canada, 2008). This growth includes a sevenfold increase in the aboriginal population in the last 50 years while the non-aboriginal population has only doubled. Furthermore, the projected growth in aboriginal populations will continue at an annual rate more than twice that for the general population.

More pertinent to the field of education is the age of this population growth as "projections show that the median age of the visible minority population would be an estimated 35.5 years in 2017. . . . In contrast, the median age of the rest of the population would be 43.4" (Statistics Canada, 2005a, p. 7). Secondary schools will witness this growth more quickly and will be faced with the challenges of culturally appropriate curriculum and modes of successful delivery. Subsequently, there is a national cry for innovative models of education which will enhance educational opportunity for these youth; Labrador is no exception.

Web-based instruction for aboriginal students

One initiative that shows promise in the attempt to address low achievement and limited educational opportunities for aboriginal and rural students is e-learning (Cummins & Sayers, 1995; Dillon & Cintron, 1997; Mood, 1995; Rossman & Rossman, 1995; Sanchez, Stuckey & Morris, 1998). In exploring Canadian opportunities for distance education to aboriginal communities, Downing (2002) discusses what has become known as the "digital divide" where such technology is not readily available to, or used by many of, these communities. He cites a 2001 Indian and Northern Affairs Canada study that concluded, "less than 7% of aboriginal communities in Manitoba, Nunavut, British Columbia and Saskatchewan have access to high speed internet" (p. 8). However, a report by Statistics Canada (2005b) on the availability of computers in First Nations schools concluded that "an overwhelming 91% of responding First Nations schools used broadband technologies to access the internet, satellite connection being the most popular method for more than half" (p. 29). The report went on to conclude that the use of technology to enhance learning was sabotaged by a lack of training and skills among teachers on how to incorporate the technology into lesson plans. This reflects the findings of an earlier study by the Government of British

Columbia (2001) which examined the technology presence and use divide in greater detail. That report identified:

> There are still significant impediments to First Nation's ability to take full advantage of the benefits of information technology, including: 1. Lack of public access sites on reserves; 2. A relatively small number of homes with internet connections; 3. A lack of culturally relevant content; 4. Lower than average literacy rates, and; 5. A lack of computer skills and socially relevant internet training programs. (p. 3)

Daniels (2004) conducted a more in-depth examination of indigenous peoples' perspectives on distance learning opportunities in the Northwest Territories and concluded that there is growing interest in this mode of instruction. He stated that:

> Students are accessing an increased number of academic courses which have more rigorous requirements and longer duration. Smaller high schools are taking advantage of online course delivery. This is probably due to the fact that low numbers of high school students in remote schools means that the teaching compliment for those schools could be limited to one or two secondary teachers. (p. 2)

Gruber and Coldevin (1995), in supporting the use of distance learning to enhance outcomes among Canada's aboriginal population, outlined five essential and useful guidelines to making it successful. These included: 1) support of the band council and the local community; 2) the identification of qualified on-site facilitators, or persons willing to undergo appropriate training; 3) adapting the course materials to the specific needs and context of the aboriginal community; 4) creating a safe and comfortable learning environment; and 5) harmonized course schedules with activities in the local community.

The use of distance learning has mushroomed across the country with a growing number of regions recognizing its usefulness for aboriginal contexts (Daniels, 2004; Downing, 2002; Fiddler, 1992; Greenall & Loizides, 2001; Gruber & Coldevin, 1995; Jewison, 1995). The Government of Nunavut (2005), after reviewing the literature and current models, establishes a more recent context for the use of e-learning in rural aboriginal schools. It concludes that e-learning is

> a means of bridging distances, of providing quality instruction for all students ... a means to assist teachers in improving instructional practices and of gaining needed skills. Finally, it should and can be a means of creating communities of inquiry which suit the needs of Nunavut learners. (p. 40)

It is important to note, however, that not all learners may be suited to the online learning environment. As Kearsley (2000) explains, "learning online is much different than learning in a traditional classroom" (p. 62) with one of the most significant differences being the increased learner autonomy in the virtual learning environment. A review of the literature reveals a number of critical factors for the successful online learner. Meyer (2003) and others (e.g., Alberta Distance Learning Centre, n.d.; Crouch & Montecino, 1997; Cuthell, 2002; Downs & Moller, 1999; Flanigan, 2000; Hughes, 2004; Mulcahy, 2002) suggest that success in online courses is heavily influenced by what the students bring to the learning environment. Evidence supports the claim that visual, independent learners are more likely to be successful in online learning than aural, dependent, more passive learners (Meyer, 2003). The same sentiments are echoed in the work of other researchers who maintain that successful online learners need to be independent, highly motivated, organized, and have good time management skills (Crouch & Montecino, 1997;

Cuthell, 2002; Downs & Moller, 1999; Flanigan, 2000; Mulcahy, 2002). Moreover, given the heavy reliance on computer-based technology for access to materials, learners with strong computer literacy skills are viewed as having an edge in the virtual world (American Center for the Study of Distance Education, 1999). While a large portion of the research on learner characteristics has involved online university courses, one could easily conclude that these factors may be even more important when implementing online courses with learners in secondary school.

Within NL, the Labrador School District has long recognized the importance of web-learning as a means not only to provide a diverse program of studies for their students in rural areas, but increasingly essential in affording even basic program options (Dr. B. Vey, Director of the Labrador School District, personal communication, May 2, 2007). The concern about limited opportunities for rural schools in Canada as a whole was discussed by Eggertson (2007):

> Rural schools tend to provide more limited resources to schools than better-resourced urban schools. Rural schools often have difficulty offering a wide range of courses, and experienced and well-trained teachers. There are fewer advanced classes and classes for students with special needs. (p. 7)

Eggertson goes on to support Vey's contention of the important role that distance learning serves in this context by stating: "Distance education and sharing of support services for students with special academic, physical and psychological needs can help to meet these challenges in rural communities. Improved information and communication infrastructures are vital to both of those initiatives" (p. 8).

Indeed, it is the wide recognition of concern for the educational outcomes of Labrador's aboriginal communities in general that were factors that led, in part, to the establishment of a large scale research project on the effectiveness of web-based instruction in the province of NL. While the use of high school web-based learning is relatively new in NL, having started as a pilot in 10 schools within one district in 2001, it has since grown to make available 39 web-based courses in the 2007-08 school year. Today, web delivered instruction provides the opportunity for students who live in rural or remote areas to take courses required to fulfill high school educational requirements, as well as the option to take elective courses not normally offered in their school. As a consequence, a large group of NL students graduate from schools in rural settings where a growing portion of their high school experience involves distance-delivered e-courses.

Research project

This study was purposively designed as part of a larger project, specifically a Community-University Research Alliance (CURA) that was established in 2007 to foster innovative research, training, and the generation of new knowledge on the use of e-learning in the province, particularly as it relates to opportunities in rural, isolated areas. The focus is on K-12 students, with recognition of the importance of transition years (from secondary to post-secondary education). Located at Memorial University of Newfoundland (MUN), the study, known as The Killick Project is broad in scope, and reflective of the priorities established through consultation with partners within the alliance. The main goals of the CURA are: 1) Capacity building for high-quality research in e-learning; 2) Increasing the amount of high quality research in e-learning, and: 3) Enhance effective knowledge exchange in e-learning within community partners and stakeholders.

Scope and Objectives of this Aboriginal Study

The current delivery of selected web-based courses through the provincial government's Centre for Distance Learning and Innovation (CDLI) to aboriginal communities in coastal Labrador has met with mixed success to date in terms of individual course completion and high school graduation. The critical importance of this approach and the potentially negative impact of failure or even limited success on participation in further education and/or the workforce is self-evident. The identification, development, implementation, and evaluation of selected interventions that have the potential to improve e-learning experiences is possible over the five years of the CURA to help determine best practices that are sustainable by the communities involved. A particular focus on home (parent), community, and school-based support-based systems, in partnership with the Labrador School District, local school councils, CDLI, and the Nunatsiavut Government is appropriate. Also, given the recent governmental agreement on self-governance with the Labrador Inuit people, partnerships in this research are essential.

This project envisioned a two-phase, three-year approach to collecting, building and disseminating knowledge. This first phase (September 2007 to August 2008), upon which this report is based, was intended as an exploratory developmental phase with the appropriate partnering groups and stakeholders. Subsequent phases have evolved from this initial exploration through the identification of interventions to support e- learning and appropriate research designs to determine and track outcomes based on implementing such interventions. The overall objectives of the study were to contextualize these issues to the aboriginal communities of coastal Labrador and to examine the effectiveness of web-based learning opportunities. More specifically, the study sought to:

1. Identify the need for broader learning opportunities among these students.
2. Articulate factors that enhance or impede the success of e-learning in these communities.
3. Examine the perspectives of students, educators and parents on current educational opportunities.
4. Foster a dialogue on improving educational outcomes and enhancing career transitions for aboriginal students in coastal Labrador communities.
5. Implement and monitor identified interventions for enhancing educational outcomes of e-learning courses.
6. Provide insight into the effectiveness of web-based learning in enhancing the quality of education for aboriginal students in rural contexts.

Study Population

Through our established alliances with CDLI, the Nunatsiavut government and the Labrador School District the project team identified five communities in which web-based courses are being used in the delivery of high school programs for students. While the wide use of web courses in Labrador schools is acknowledged, the focus of this study was specific to coastal community schools with high aboriginal populations. Limited resources for the study resulted in five schools being selected for participation. Subsequently, the communities of Postville, Nain, Rigolet, Hopedale, and Makkovik, all of which have predominantly Inuit populations, were selected. Recent Canadian census data in 2006 identified that approximately 2 414 people, 90.93% of whom report aboriginal identity, live in these five communities with a population decline of 6.74% since 2001.

The median age of 28.98 years is dramatically lower than 39 years for Canada as a whole (Statistics Canada, 2008). Table 1 presents the population profile of these communities.

Table 1: *Community profiles*

	Population 2008	Population change since 2001	Aboriginal	Senior school enrolment 2007/2008	Projected graduates 2007/2008	Actual graduates in 2007/2008
Nain	1034	-10.8%	92%	83	7	7
Makkovik	362	-5.7%	88%	28	8	8
Hopedale	530	-6%	89.6%	33	2	1
Rigolet	269	-15.1%	94.3%	11	2	2
Postville	219	1.9%	91%	16	5	5
Total	**2414**	-7.14%	90.98%	171	24	22

Education statistics provided by the provincial Department of Education (2008) identifies that, while Kindergarten enrollment since 2001 has remained relatively stable, there has been a 24.3% decrease in overall school attendance. Consequently, of the approximately 185 students eligible to graduate in that time frame only 71.35% completed high school with 68.94% of those receiving a basic high school certificate giving them limited post-secondary options. Moreover, of the 66 students enrolled in Grade 6 during the 2001/2 school year who should have been in Grade 12 during the 2007/8 school year, only 24 (36%) of them remained on track to graduate.

During the 2007/08 school year, of the total high school enrolment in these communities, 35 students were completing 93 course enrolments (total number of individual registrations in web-based courses). On average, in each year, high school students in most of these communities taketwo or three web courses; however, in certain communities, some students may enroll in as many as six web courses. In the greater Labrador region there were 29 different high school courses being accessed via web- format while there was a total of 39 web courses available in the province as a whole (see Table 2).

Table 2: *Enrolments in web courses for 2007-08*

	# of Web courses as of Sept/07	# of Students Sept/07	Total course enrolments in Sept/07	# of students June/08	Total course enrolments in June/08
Province	39	1004	1781		
Labrador	29	76	161		
Postville	6	12	24	12	23
Nain	6	4	7	4	7
Rigolet	17	10	42	8	30

Hopedale	2	1	2	0	0
Makkovik	9	8	17	7	16

Key informants for this project were identified as: teachers, school administrators, parents, and students from those five communities who are directly involved in these web courses. Letters of introduction and consent forms were sent outlining that participation was completely voluntary. Table 3 presents the participation rate. In addition, an interview was held with a Labrador School District program specialist (included with administrators) directly involved with web courses in these communities.

Table 3: *Participants in study*

	Participated	Possible	Return rate
Students	25	35	72%
Administrators	6	6	100%
Parents	16	35	46%
Teachers	9	9	100%

Study Design

The purpose of the project was to examine the perspectives of students, educators and parents currently involved with web-based courses in these aboriginal communities. A qualitative, grounded theory approach to data collection was utilized in which a combination of individual interviews and focus groups were held with the key-informants. Ethics approval was received and signed consent was obtained. Letters of introduction were forwarded to potential participants. Separate focus groups and/or interviews were conducted with each type of informant (student, teacher, parents, and administrators) in each community. Strict confidentiality was maintained. No person, group or community was singled out or identified in the study results.

In total, 29 individual interviews and six focus groups (representing the 56 participants described in Table 3) were conducted in the five communities during the Fall of 2007. Semi-structured, open-ended questions were asked to explore the experiences and perspectives of participants on the use of e-learning, the factors contributing to and limiting its success, and suggestions for improving the format in these communities. Participants were eager to discuss their experiences with web courses and spoke with candor about their perspectives on this mode of delivery. All participants were comfortable with being audio-taped and voiced appreciation that their opinions were being sought. A research assistant familiar with and known in these communities became involved with the project and visited each group to conduct the data collection. All recordings were subsequently transcribed and analyzed using a grounded theory approach where emergent themes were coded and noted for frequency so as to identify dominant findings and for identifying emergent themes.

Given that this study was conducted over a complete school year (2007-2008) the researchers were able to determine student performance in the web courses. Final marks for each student in these courses were collected and compared to the average provincial mark for that course. In

addition, school administrators were interviewed about their perceptions of student performance with particular attention to whether or not performance in web courses differed from on-site courses. A wealth of data emerged which provided insight into the experiences with web based e-learning in these communities, the needs of the students, and the perspectives of all involved in this mode of curriculum delivery.

The study produced a wealth of qualitative and quantitative data on the experience and success of web-based learning for a population of aboriginal students. A number of themes emerged during the focus groups and interviews which speak to the perceptions and experiences of these participants and a review of the student's academic performance in these courses, along with some comparison with their provincial peers, helps frame these findings. What emerged are a number of obstacles to success, as identified by participants, which will help inform other educators seeking to implement e-learning as part of their curriculum.

Analysis and Findings

The results of the focus group and the interview data gathered from students, parents, and educators are described under the following thematic headings that emerged from the analysis: (i) E-learning as an Essential Component, (ii) Success in E-learning, (iii) Developing Personal Skills, (iv) Teacher Support, and (v) Web Course Delivery Processes. It is interesting to note that participants valued this opportunity to participate in the project and voiced appreciation that their opinions were being sought.

E-learning as an Essential Component

Overwhelmingly, the dominant theme that emerged from the data was wide-spread recognition of the critical importance of e-learning in these communities. All participants — students, educators and parents, voiced appreciation that this mode of instruction was available to students. Participants viewed e-learning as an opportunity to receive a level and range of education which would not otherwise be available to them. Students were quick to note that, "*Web courses are essential for career opportunities and particularly if you are interested in a career that is science-oriented like becoming a pilot.*" As one parent indicated, "*Without web courses, students would never be able to get the prerequisites needed for future studies such as medical school.*" Similarly, as one educator noted, "*Students are able to do courses they would not be able to do on-site, either because of teacher allocation issues in the school or because the school does not have a specialist in that subject area on staff.*" Participants were aware of the challenges that the Labrador School District faces in delivering quality academic programs to rural schools, with low enrolment and with systemic struggles to recruit teachers. As one educator explained, "*Attracting qualified specialist teachers to a small, northern, remote, fly-in, aboriginal community can be a challenge.*" Participants were also aware of achievement issues and perceived readiness skills to compete in high school courses. Nonetheless, participants were unanimous in recognizing e-learning as an essential component of the rural, aboriginal student educational experience.

Success in E-learning

A theme that emerged early was a sense of surprise and relief that these students were able to meet with academic success in these courses and compete with their provincial counterparts. Educators, parents and the students themselves reported that there was a perception that

academic standings in these communities are much lower and that their ability to meet with success in wider academic areas was limited. However, the students' experience with e-learning changed this perception as parents and students, in particular, voiced a sense of surprise that they had the scholastic skills to meet the curriculum outcomes as well as converse and contribute to the interactions with their provincial peers. As one student indicated, "*It helps build self-esteem when you succeed in a web course since you are compared with students around the province and not just in your small community.*" This heightened confidence was linked, in part, to the realization that academic performance was being measured by specialist teachers in a provincial context. As a result of this success, students felt that more post-secondary options were open to them and that they would experience a similar level of success. Such positive self-perception is important as students develop future career plans.

Developing Personal Skills

While the academic value of web courses was widely recognized, so too were the personal skills that online learning experiences tended to foster. The vast majority of participants felt that along with boosting academic confidence, the online learning experience fostered communication and leadership skills. Improved skills in time management, computer literacy, collaboration, independence, and an enhanced work ethic were also identified as additional benefits of the web experience. As one student explained, "*Web courses help build independence and a sense of responsibility.*" Educators in particular, saw this transfer of skill to their on-site courses and were particularly pleased to see web course grades correlate with on-site grades. They reported this as validating the quality of their instruction and grading techniques. An additional benefit was the time it afforded them to work with on-site students who needed more individualized instruction and support – outlining that all students in the community benefited from the presence of web courses. As one educator added, "*Web courses enhance on-site teaching since teachers can see how online teachers are approaching various topics and, as such, are particularly helpful for new teachers as a resource.*" Such findings raise interesting professional development implications that warrant further investigation.

Teacher Support

The web teachers (e-teachers) themselves were widely seen as being central to the success that these students encountered. "*Excellence*" was a descriptor that was widely used to describe these instructors and the web course structure as a whole. E-teachers were seen as being patient, readily available, clear and knowledgeable of their subject areas, and effective in their methodology. They were seen as giving timely feedback, displaying attentiveness to student need, and being encouraging of student participation – drawing students into the course and the developing discussions. Some students noted in particular they "*liked how the online teachers interact with the students online.*" Participants were especially appreciative of being able to fax, email or telephone the instructors themselves as it established an enhanced sense of personal connection and reassurance. Given the initial trepidation of engaging in web courses, this personal connectivity is clearly an essential component for success of students from these communities.

Web Course Delivery Processes

The web course structure, with recorded classes, ready access from any computer site, tutorials, worksheets, help desk, performance alerts, online notes, etc. were also named as being features

that were beneficial to these students. Some students even highlighted the benefits of web courses for shy students "*since you can ask questions privately without having to ask them in front of the class.*" Given the rural nature of life in this region, delays experienced in travel, weather, cultural/community events, this structure seemed particularly well suited for these communities. One student noted this feature "*was particularly useful when traveling for sports*".

Student Success and Academic Achievement

Year end academic results for the web courses were collected and analyzed (Table 4). While the information presented in Table 1 reports a 92+% graduation rate for these students, the data in Table 4 affords an indication of how the students in this study performed in their courses in comparison with the provincial student average. Provincial averages (web course and on site courses) are outlined, as are web-only averages and the average mark for the students involved in this study. Year-end averages are not available for courses that did not feature public exams. The table does not present, due to confidentiality concerns, any individual student marks (that often ranged widely in many of the subject areas). Interpretation of this data should, therefore, be done with great caution. It is also critical to consider the students who are enrolled in web courses, in the context of a significant drop-out or fall behind rate. Only 48% of students remain on track to graduate and, as such, only the more academically able are participating in these courses.

Nonetheless, the web course results of the students in this study were encouraging when compared to provincial averages. In about half of the courses the study group average was higher; however, as mentioned earlier, the range of marks in individual courses was often wide: see for example Math 3204 where the marks ranged from 39% to 93%.

In addition to the final marks, some educators in each of these five schools were asked about their perception of student performance in the web course in relation to their non-web courses. Respondents were very quick to identify that many factors impacted on how a student performs during a school year, regardless of mode of delivery. They were quick to identify the issues that have long been identified in this Labrador region including poor attendance, social and personal challenges, student motivation, and time management skills. However, the general consensus was that students tended to do as well in the web course as in their other courses, though one respondent indicated a tendency towards web course marks being slightly lower. They all reiterated what had been reported in the initial interviews with respect to factors that promote success for these students in web courses

Table 4: *Academic Outcomes (2007-08)*

Web Course	Provincial Average	Average mark in web version	Average mark in study Population	Difference from provincial average	Range of marks in the study
Math 1204	66.1		55	-11.1	30-67
Math 2204	61.6		52.1	-9.5	36-89
Math 2205	78		76	-2	n/a
Math 3204	61.1	63.5	63.7	+2.6	39-93

Math 3103	67.7		54	-13.7	50-60
Math 3207	78.3		90	+11.7	n/a
English 1201	67.1		61.5	-5.6	55-68
English 2201	61.5		65.3	+3.8	42-90
English 3201	66.8	65.7	56	-10.8	n/a
Writing 2203	66.6		63.7	-2.9	54-74
Science 1206	60.3		52.2	-8.1	40-65
Chemistry 2202	71.8		55	-16.8	n/a
Chemistry 3202	69.0	71.1	89	+20	n/a
Physics 2204	69.1		76	+6.9	n/a
Physics 3204	71.3	72.7	*		n/a
Biology 3201	64.3	64	80	+ 15.7	65-95
Canadian History 1201	70.9		88	+ 17.1	n/a
World History 3201	67.3	80.9	86.5	+19.2	83-90
World Geography 3202	67.3	69.6	70.7	+3.4	68-75
Design and Fabrication 2212	72		83	+11	71-91
Communications Technology	73.1		72.3	-0.8	55-91
Experiencing Music 2200	74.5		73.7	-0.8	52-89
Integrated Systems 1205	70.1		65.5	-4.6	50-76

* Deferred exam. Note: Based on available data as of October 8, 2008.

Areas for Improvement

Despite their very positive perspective on e-learning experiences, participants were eager to outline areas where the service could be improved. Organizational, communication, motivational and contextual areas were identified (summarized in Table 5). In subsequent sections, key concerns and challenges are described by area.

Table 5: *Areas for Improvement*

Organizational	Communication	Motivational	Contextual
Improve scheduling	Improve communication between e- teachers and parents	Improve student readiness skills for web courses	Consider alternate space for students taking web courses in schools
Improve on-site supervision	Improve communication between parents and school	Identify and communicate student attributes for success in web courses	Improve technical support
Limit student access to Facebook, etc.	Improve communication between e-teachers and students	Improve design of web courses so they are less text-based	Provision of specialist supports for these schools
Increase financial support for web courses in school to purchase materials, photocopying, etc.	Improve communication between e- teachers and school staff		Provide support for social and emotional issues that may be affecting student success in web courses
Improve on-site technical support			

Organizational Challenges

While participants were quick to name recent improvements in technology and access, there remain a number of logistical issues that complicate the delivery of web courses. One challenge is the half hour time difference between the island and Labrador. Many web courses follow the provincial time zone, a practice that often results in a clash with the school schedule which follows the Labrador zone. As a result, many web courses were starting on the half hour in these schools, midway through regular class periods. As one student pointed out, "*As a result of time clashes, we have had to miss homeroom or parts of on-site classes in order to attend web classes or we have had to miss web class in order to go to on-site class*". Some schools have made adjustments to their school schedule to be in line with the web schedule (e.g., lunch period; school start and end times); however, this did not appear consistent across schools. This time difference issue was viewed as a major obstacle to student participation and success in web courses since it required students to listen to the recorded class of what they had missed and to try to understand that portion of the class largely on their own (while e-teachers were sometimes available to answer questions after

class, this was not always the case since they might have to go to another class).

One of the most significant organizational issues identified by all participants was the lack of on-site supervision in web courses. Even students noted "*There was little supervision on-site and they could get easily distracted because of this*". As one parent indicated, "*Since there is no supervisor to monitor student behaviour, students can get distracted by others in the web course room because they are fooling around or talking.*" This lack of supervision often also makes it easier for students to access Facebook, MSN, and other such sites when they should be working. Many indicated that the supervision issue was a result of school-teacher allocations.

Teachers report full teaching schedules, which limits their ability to be available to assist and/or monitor student work in the web class. Similarly, administrators in these small schools are often juggling administrative duties and teaching duties, making it extremely difficult to take on the added responsibility of overseeing web classes. Simply put, educators explained, "*Schools do not have the bodies to cover off supervising web class and teach all the courses that have to be taught on-site*". As one administrator explained, "*The administrator in the office often becomes the supervisor by default*". This is particularly burdensome for coastal administrators who often have numerous duties. As one administrator stated, "*Four of the five class periods students have web classes, so you are trying to monitor their classes while teaching your own, while balancing administrative duties.*"All of the educators noted the enormous amount of school personnel time and tasks involved in trying to support the distance program on-site (e.g., supervision; set up labs; provide on-site support for students having difficulties with questions; register students; set up passwords; show students how to log on and use the system; download tests; copy tests; organize supervision of tests; scan tests; provide technical support [one technician is shared between coastal communities]; notify e-teachers of school closures; notify e-teachers when marks are due; collect marks; record marks; and photocopy marks).

In an effort to provide some on-site supervision, web course computers most often are strategically placed in a space where students can be monitored by a school staff member doing other duties (e.g., teaching an on-site class) or near the main office so that the administration and/or the school secretary can keep an eye on the students. If the web is down, a lack of supervision becomes additionally problematic in that these students are free to wander or engage in activities of which the school may not be aware. Another issue noted was the lack of financial support for the schools to offer web courses when it comes to things such as supplying paper and toner for web course printing, as well special equipment that might be required for some courses (e.g., special biology slides).

While online access was reported as having improved in recent years, participants did report struggles with continuous access and the fact that web courses move forward regardless of individual student access. Educators explained that sometimes technology support issues can arise, particularly in September when schools are attempting to get systems up and running, since there is only one technician for the coastal schools. Weather closures were noted as particularly challenging. While the online notes and recordings of classes were helpful, unscheduled downtime often results in extra pressure on the student to make up lost time.

Communication Challenges

Sharing information about web course opportunities, demands, structure and progress was

named as an obstacle between home and school. Parents, in particular, voiced frustration with the effectiveness of communication structures, which they felt unaware of their child's progress or performance and ways in which they could support their child in the web course experience. Parents reported that the school needed to enhance communication with them and that methods should be established where they could connect with the e-teacher, despite limited levels of technology awareness. Parents expressed concern for the absence of parent-teacher interview with their child's e-teachers. As one parent indicated, "*There is very little information provided for parents from e-teachers. We have to rely on the kids for information or during parent information night at school we might ask the principal or other teachers on-site who may be involved with the program, but other than that we get nothing. There are no emails from the e-teachers.*" Even students noted they "*did not believe parents are very informed about web courses.*" While some students did think there was a night hosted the previous year when parents could log into the web course, students indicated there were no parent-teacher interviews with online teachers.

The students themselves voiced struggles with communication in that they were sometimes frustrated by the long wait-times to receive a response regarding a question versus the relatively short period of time that would be experienced in a face-to-face environment. Furthermore, as one student concluded, "*It is difficult to explain certain things via email, math, for example, and so often we go to a teacher on-site for help*". Furthermore, students added that they were aware that a guidance counsellor was available online, but few knew what the role of this person was.

School staff also felt that communication with e-teachers could be enhanced so that they had ongoing awareness of the demands and expectations related to web courses while remaining current with student progress. This breakdown in communication with onsite teachers was particularly troublesome when students needed a "face-to-face" support/ consultation. Not to minimize the overall helpfulness of e-teachers, participants did report that at times students needed more individualized support and/or direct involvement of a teacher and that on-site teachers were not aware of what was happening in the e-courses. Moreover, educators felt that at times there were expectations placed on them, of which they had little awareness (e.g., finding out about upcoming labs from students), were unrealistic given the many demands placed on them in the school. Educators felt they could be much more effective coaches and supporters of students if there was more communication between e-teachers and the school staff.

Motivational Challenges

Building on the confidence issues that students face when first enrolling in web courses, there was significant concern expressed among all participants for the readiness of students to take e-courses. Computer literacy and technology awareness is particularly problematic in that students are assumed to have a high level of skill required at the start of these courses. As one parent indicated, "*E-teachers sometimes make assumptions that students know how to use all the equipment.*" While students are very individual in their skill set, a lack of supervision, limited access for support on-site, fragile confidence to begin with, and sometimes unappealing course designs (sometimes too text-based) can frustrate and disengage new students early in this new experience.

Likewise, participants felt that web courses are better suited for students who have a strong work ethic can manage time effectively, and are highly focused and resilient to frustration. As one student noted, "*You got to have enough determination not to surf the net during offline and online time.*" There is a perceived assumption that all successful participants have these skills and are

being diligent in their self monitoring, especially in the relative absence of on-site supervision. This is exacerbated in the aboriginal context where cultural values of non-directive parenting, resistance to asking for help, and reluctance to being viewed as struggling typify these students.

Participants recognized that while e-learning can be an excellent experience and opportunity, it is a lot of work for the student in a much more independent context than on-site courses. A concern among parents and teachers was that students were not ready for e-learning and were not fully prepared prior to high school start-up. The confidence, self-esteem and skills required to start web courses were widely seen as needing to be addressed at the intermediate school level, prior to exposure to e-learning at the senior high level.

Contextual Challenges

Finally, there were a number of concerns specific to the realities of these communities that were identified as complicating the web course experience. Limited space in schools, limited bandwidth, limited ability to assist students in specialty courses and difficulties of aboriginal populations to succeed given social and emotional issues were some of the issues identified by educators. All of the schools have had to adapt their learning space to accommodate web course offerings. For some schools, this adaptation means locating e-students in the office area so that the administration can supervise students, while others have taken their library and made it the web course room. The latter solution is mixed, given than web course use tends to limit the use of the library as it was intended by the school community. Yet other schools have been able to allocate a specific room for web course work stations. With respect to bandwidth, while connectivity has improved in recent years in these communities, there are still times when it can be an issue. Not having a qualified teacher on-site to assist students with specialist courses is particularly problematic. In many of these schools, they may not have someone on staff able to assist with the labs, particularly in chemistry and physics. Furthermore, success in web courses can sometimes be complicated due to family environments where education may not be a priority. In addition, students are dealing with social and emotional issues endemic to many aboriginal communities.

Discussion and Implications

There is little doubt that distance delivered courses utilizing e-learning present a blend of both opportunities and also unique challenges, especially in the rural isolated communities. This study of aboriginal student populations involved in e-learning revealed many current successes in terms of course completion and marks achieved. However, the range of individual successes with respect to student performance and concerns are contextualized with the realization that only a fraction of students remain in school long enough to experience e-learning. Nonetheless, the critical importance of web-delivered courses in these communities was evident to study participants, and all stakeholders associated with the school system (including parents) that the researchers talked to clearly appreciate the opportunity afforded by this mode of delivery.

The benefits of e-learning to both the students for their respective programs, and the school district in delivering an appropriate and comprehensive program, are clear from the data presented in this study. Success in these courses has helped to build student confidence in their academic ability to compete with their provincial counterparts as well as to strengthen student's personal work and study habits that will benefit them as they continue on their career development

pathways.

This research surfaced areas to improve current successes and ready more students for the e-learning experience by addressing key challenges.

Addressing Learner Characteristics and Readiness Needs

If the school program is to incorporate e-learning opportunities, the elementary and certainly the intermediate curriculum will have to proactively ready students for it. Such action might well have additional benefits by enhancing self-perception and school retention – factors which were deemed as significant in this population of students. As identified in the literature (e.g., Cummins & Sayers, 1995; Dillon & Cintron, 1997; Mood, 1995; Rossman & Rossman, 1995; Sanchez et al., 1998) not all students have the pre-requisite personal, scholastic and motivational attributes as well as the technical skills necessary for success in an e-learning environment. A number of these however, could be developed as students progress through the middle school grades, years during which risk of dropout increases dramatically. This is a particularly significant area of concern for populations with high drop-out rates, where many students continue to leave prior to opportunities to interact with web-based learning.

Addressing Communication Needs

The data also identified the critical importance of effective communication among all stakeholders involved with web courses so as to respond to issues that arise. In particular, study data revealed a need to engage the e-teacher in such processes, especially with respect to communicating with both parents and on-site school personnel. This would also help reduce the somewhat isolated nature of the e-teacher. Students were also concerned at times and missed not having immediate and direct contact with their e-teacher, but it was also evident that effective communication was being maintained through asynchronous means normally associated with distance delivered courses. This was particularly important in schools that lacked teachers with the specialized subject matter in web courses.

Addressing Organizational Needs

Organizational and logistical issues related to ongoing course delivery both within individual schools and the region will also have to be addressed for successful implementation. Issues such as time zone differences, school schedules, student supervision, the location of web work stations, online distractions, and the quality and consistency of internet connections may seem like trite consideration, but were consistently named by participants as being significant obstacles. While e-learning might well offer solutions to one set of concerns for educators of aboriginal and/or rural students, successful use of the approach will surface another set of challenges.

Addressing Contextual Needs

Finally, given the wide recognition, as well as evident success, of the use of e-learning in these communities, policy makers and district/provincial level managers will have to address the need for resources to allow the delivery mode to continue. While the scarcity of resources and expertise rationalizes the need for web delivered curriculum, rural schools need to be appropriately resourced to allow students the greater opportunity to access a broader academic program. Likewise, avenues of effective communication need to be developed so that e-teachers who are situated in urban centers are aware of and sensitive to the myriad of social and contextual issues

that these students face. Finally, training in cultural diversity is also of critical importance for e-teachers who are increasingly seen as essential participants in these students' academic careers.

Concluding Remarks

This study provided evidence of the importance, usefulness and learning benefits of web-delivered instruction as a viable alternative to face-to-face instruction for aboriginal students in rural, isolated contexts. It also indicates a critical need for communication and planning, within the context of both the individual student's readiness to avail themselves of e-learning opportunities, as well as the school's ability to support them in the process. While the authors do not suggest that this mode of delivery replace traditional classes or schools, the data demonstrates that web-delivered instruction is a viable alternative to face-to-face instruction and provides students with the opportunity to engage with the provincial peers and access a more diverse curriculum than their neighborhood school can offer.

In doing so, the recommendations for improvement that emerged from this phase of the study do hold potential for increasing student success rates with e-learning curriculum. Some of these recommendations concern the broader e-learning structure, whilst others are pertinent to individual schools where the actual learning conditions for students vary, especially with respect to supervision, space and resources. Others are directed at improving communication between students, e-teachers, parents and school personnel. Most of these seem to be fairly straight forward to implement. However, other recommendations that address motivational and student development issues will take more time, commitment and investment. These include the development and implementation of an e-learning readiness course at the intermediate school level, and the identification, articulation and development of student personal attributes and work habits that can contribute to the successful completion of web courses prior to the enrolment in such courses.

If the school program is to incorporate e-learning opportunities, the elementary and certainly the intermediate curriculum will have to proactively ready students for it. It is evident that a first step in improving the use of e-learning for aboriginal students at the secondary level is to both retain students long enough so they can avail of it, and improve self-perception to the point where they are willing to experience it. Additional benefits of such proactive planning and investment are endless, and include reduced social risk, enhanced career planning and long term economic development.

However the study also identifies a need for additional research that will inform and support those engaged in implementing online technology to strengthen their school programs. To that end, this project has entered a second phase where the researchers are conducting a pan-Canadian examination of e-learning in aboriginal communities. An exhaustive list of educators in other regions of the country who are engaged in using e-learning for aboriginal students has been developed and a series of interviews have been completed. The goal is to identify whether similar organizational, communication, motivational and contextual obstacles are being encountered and what, if anything, is being done to address them. The researchers hope to identify proven best-practices that can inform the aboriginal communities involved in the initial study so as to optimize student success, as well as contribute to a broader understanding of enhanced use of this rapidly growing medium of instruction for aboriginal students in rural areas. These findings will be

reported in an up-coming edition of this journal.

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[i] E-learning, in this study, references the delivery of standard high school curriculum via electronic, synchronous web format. In the broader context, e-learning references web delivered curriculum via both asynchronous and synchronous formats.