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Canada in partnership with the provinces and territories. SchoolNet
operations in Newfoundland and Labrador are essentially managed through
STEM~Net, with a similar goal. This paper describes the influence of STEM~Net
and SchoolNet on students and teachers, the technology infrastructure and
resources, the classroom use of ICT, and the approaches to professional
development and leadership that have contributed to successful
implementation. Findings suggest that while the outreach projects have
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distinguishes this one school from other less successful project schools is
its collaborative model of leadership. (Contains 20 references.) (AEF)

Information Technology, Innovation and Success in a Small Rural School

by

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Abstract

This paper reports on a case study of one rural school that has been recognized as an innovative school in respect to the integration of ICT in the teaching and learning environment. This case study is part of a larger study to assess the impact of two outreach projects directed at the implementation of ICT in k-12 classrooms. Findings suggest that while the outreach projects have positively influenced the implementation of ICT, the factor that distinguishes this one school from other less successful project schools is their collaborate model of leadership.

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This paper reports on a case study of one rural school, Genesis Academy (a pseudonym), in Canada's most eastern province, Newfoundland and Labrador. Genesis Academy has been recognized as an innovative school in respect to the integration of information and communication technology (ICT) in the teaching and learning environment. This case study of Genesis Academy is part of a larger study that is focused on the assessment of the impact of two outreach projects on student learning and the development of ICT. The first project, STEM~Net, was initiated in 1993 by the vice-president of Memorial University of Newfoundland. Its goal was to design and develop a province-wide computer network for all k-12 educators in Newfoundland and Labrador. STEM~Net, still in operation, was a founding member of the second project, SchoolNet, which was established by Industry Canada in partnership with the provinces and territories. SchoolNet operations in Newfoundland and Labrador are essentially managed through STEM~Net and its goal is similar. This paper will describe the influence of STEM~Net and SchoolNet on students and teachers, the technology infrastructure and resources, the classroom use of ICT, and the approaches to professional development and leadership that have contributed to successful implementation.

The researchers conducted this study in the context of the considerable evidence that investments in innovation and change in schools rarely result in prolonged success, particularly if the initiative originates at the university or government level (Cranston, 1994; Deal, 1990; Fullan, 1993, Sarason,1998). For example, in 1990, Deal stated, "We have tried almost everything conceivable to improve our public schools. We have invested millions of dollars...only to watch new skills disappear amidst old routines" (p.6). Sarason echoed Deal's lament in 1998 by asking, "Why has the expenditure of scores of billions of dollars had such disappointing consequences?" (p. xii).

In contrast to these images of failure, the school described in this case study, despite many limitations, has been successful and can provide a number valuable lessons for those who wish to bring about meaningful change through the integration of ICT in teaching and learning environments. The research

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team determined the level of the school's success on the basis of cross case analysis of the data collected from 15 schools that were investigated. Of all the schools, we determined that this school was the most innovative. The validity of our selection was subsequently substantiated when, through a process completely independent of our research, this school was selected as 1 of 24 innovative schools in Canada.

Methodology

Data were collected over the course of six months through the administration of two surveys related to professional learning and school leadership (Leithwood, 1995a, 1995b), a three hour focus group meeting with all the staff, a presentation by the school technology team, a review of the projects that the school had placed on their Internet site, and a three-day visit to the school. During the three-day visit, data were gathered through field notes of observations and through semi-structured interviews with the principal, teachers, the technology teacher, the teacher-librarian, and students. Teachers were chosen according to the following criteria: a teacher known to be active in the integration of ICT in instruction, a teacher recommended by the principal, and a teacher chosen by the researcher at random from the faculty list. Three groups of students representing grade levels (primary, elementary, intermediate and high school) were interviewed. At least one of these groups had experience in the use of ICT in their learning. The other two groups were chosen at random from class lists. In addition to the data gathering at the school, the researchers interviewed four members of the STEM~Net and the SchoolNet projects: the director and the senior training officer of STEM~Net, and two coordinators of SchoolNet programs.

A variety of methods were used to analyze the collected data: constant comparative method, theoretical memos, clustering of conceptual groupings and corresponding matrices (Glaser & Strauss, 1967; Miles & Huberman, 1994; Strauss & Corbin, 1994). Data were coded by two researchers to insure inter rater reliability of the coding. Some codes were developed deductively on the basis of the current related literature related to the learning organization framework that guided the analysis. Other codes were developed inductively during the process of interviews on the basis of field notes, and yet other codes were added during the analysis as the researchers uncovered unexpected themes (Miles & Huberman, 1994; Potter, 1996).

The Outreach Projects: SchoolNet and STEM~Net

SchoolNet is a collaborative initiative of the Government of Canada through Industry Canada, the provincial / territorial ministries of education and the private sector. Its goal is to facilitate access of Canada's schools and public libraries to the Internet. This national education network, which consists of the provincial and territorial networks was officially announced in 1993. One aspect of SchoolNet participation with the provinces and territories and the private sector has been through STEM~Net in Newfoundland and Labrador. STEM~Net was established in 1993, as well, and has established a presence in Newfoundland and Labrador through teacher e-mail accounts, curriculum workshops, and annual provincial technology conferences. Essentially, STEM~Net acts as the local SchoolNet representative in Newfoundland and Labrador and manages and coordinates most of the SchoolNet projects in the province. While SchoolNet and STEM~Net are involved in a number of specific programs that relate to their overall mission which is to ready learners for the knowledge-based society through the creation of educational resources through information technology, there currently exist two major initiatives that have had a major impact upon our study school: the SchoolNet GrassRoots Program and the SchoolNet DirecPC Satellite Program.

The SchoolNet GrassRoots Program is a national program that provides financial assistance to K-12 schools for the creation of innovative and interactive learning projects on the Internet linked to curriculum outcomes. These projects are intended to foster the acquisition of academic, employability, and computer skills in Canadian youth; build unique and relevant Canadian content on the Internet; integrate information and communication technologies into learning; and facilitate increased connectivity and training opportunities.

All K-12 teachers are eligible to submit project proposals. The main sources for teacher awareness of the GrassRoots program appear to be promotion by STEM~Net through district representatives, e-mail, and

annual awareness conferences. Some awareness occurs through the STEM~Net web site. STEM~Net personnel also provide direct support to teachers in writing GrassRoots proposals. If the project proposal is accepted, it is funded according to the following categories: Category A ($300), Category B ($600), or Category C ($900). In order to receive the funding, the project must be developed as a shareable resource that is published on the Internet. The financial assistance associated with the development and completion of a GrassRoots Project is perhaps, the primary reason why many teachers participate.

The second SchoolNet initiative, the SchoolNet DirecPC Satellite Project, has proved to be an essential component related to connectivity that has allowed the implementation of ICT at our case study school to progress. Schools in Newfoundland and Labrador are connected to the Internet through either a cable modem, an Asymmetric Digital Subscriber Line (ASDL) connection, a DirecPC satellite dish, a cable point-of-presence or a Serial Line Interface Protocol (SLIP) telephone line connection. In the case of small rural schools such as Genesis Academy, STEM~Net, in partnership with the school district and a private telecommunications corporation, has made available the SchoolNet DirecPC Satellite program . This program provides to the school a 400 Kbps DirecPC [in] and a 33.6 / 28.8 /14.4 Kbps SLIP [out] through long distance dialling. Also, STEM~Net has supplied rural schools with a toll-free number and 30 hours of long distance service per month paid for by the provincial department of education. In spite of this, the most common problem associated with the SchoolNet DirecPC Satellite program in our case study school, as in others is the costs incurred for upload time through the modem connection.

Genesis Academy

The Infrastructure and Resources

Genesis Academy is a K-12 school with 275 students and 19 teachers including the school principal. It serves all students from seven rural communities in Canada's most eastern province, Newfoundland and Labrador. The school building, a 30 year-old wooden frame construction, is not modern or conducive to innovation. Essentially the building consists of a series of classrooms and a gym--a design that the principal describes as "meant for the curriculum in 1968."

In terms of ICT infrastructure, resources have been somewhat limited. Until September 1998, with the installation of DirecPC Satellite, Internet access was restricted to one telephone line allowing access from only one computer terminal at a time. This Internet access was provided through STEM~Net through a modem pool accessible via a toll-free telephone number. Students now have access to the Internet through 18 workstations simultaneously.

While the installation of DirecPC Satellite is a major advancement, the school, and in fact the entire region, is restricted by an inadequate telecommunications network serving their region. Internet access is available only through long distance using analog technology. Also, a recent change in long distance rates that provides for unlimited long distance use at a predetermined rate has resulted in traffic congestion, thereby, compounding telecommunication difficulties. In spite of the positive attitude toward the support that they have received, those interviewed remain quite frustrated with the level of Internet connectivity that they have been able to achieve. They would like to be able to hook up all classrooms, the library, and the administrative offices to the Internet. At this point they have not been able to identify potential funding sources for these visions, nor have they been able to obtain a commitment from the sole telecommunications provider to upgrade the telecommunications infrastructure in the region.

In addition to frustrations related to the limitations imposed by connectivity, those interviewed also highlighted concerns related to the lack of computer equipment and limited teacher time for professional development, instructional planning, and project proposal writing.

All teachers and students complained of the difficulty gaining access to the computer lab. With only one lab with 18 computers to serve all classes, the inadequacy of the resource is obvious. The current situation dictates that priority is given to grades 7-12 students who are completing courses that require access to the lab. Any time that is available beyond those scheduled courses is shared with all others. One high school teacher noted that the GrassRoots project that she and her students did last year was

done entirely as an after-school project because access to the lab was not available during the school day. The following comment by the school principal reveals the frustrations surrounding this issue of computer equipment:

> That gets back to my first point, the financial resources in order to keep up with it. Where things change so much, it's hard to justify putting a lot of money into anything. In two years time, it's going to be rendered useless and you can't sell it. If it was something like a glass backboard for basketball that you can keep there, that's perfect because you got something to show for your money. When you invest $2,000 in a piece of equipment, and in two years time it's out in the AV room collecting dust, that's not a wise way to be spending--I don't think it is. You're in between a rock and a hard place. You want to move along with technology, but yet you have limited financial resources that you can put into it. What do you do? If they're going to outfit big schools with these big new labs and everything like that, then I think every school should be fitted out. They want technology in the school but they're not giving us the resources to do it.

While the level of support that the school has gotten for their various fundraising activities has encouraged the school's technology committee, they realize the limits of such endeavors in the context of the enormous outlay of funds required to provide the necessary computer resources. Businesses have been generous in providing used computers through SchoolNet's Computers for Schools program. These computers still have functional value in respect to various basic learning outcomes. The school board has provided several funding schemes to encourage and reward local efforts in this regard; however, the pace of change in computer technology continues to place an increasingly heavy burden on their budgets as well. The Department of Education provided resources to support the introduction of several communications technology courses at the high school level. This funding allowed the technology committee to purchase specialized equipment such as video editing equipment and a scanner. A targeted federal Government employment program, Bridges, has also provided needed human resource support. In fact, the person hired through the Bridges program works as a computer lab assistant and is viewed by some of the primary students as a teacher. All students noted the assistance provided by this person. The technology resource teacher felt that she would have been restricted in some of the support that she could offer without the support of the person hired through the Bridges program..

The principal, while anxious not to downplay the learning benefits to students, noted that a primary benefit of the GrassRoots projects was the funding that came with them.

> I'll say to you, GrassRoots programs are great and the kids learn a lot, but the benefit is to the students also in terms of money that comes in.

A high school teacher who has been heavily involved in GrassRoots projects expressed a similar sentiment:

> Another reason for the Grass Roots projects is for the money that goes back into the school. So you know you're not only doing it for the students, but there's this monetary value that comes out of it at the end. That's really important to the school and to the computer lab.

Considerable extra time, beyond normal routines, is required of teachers who are developing lessons using technology or engaging in special GrassRoots projects. Even more time is required of the technology resource teacher. At this school, several of the teachers referred to themselves as Internet addicts. The limitations imposed as a result of equipment shortage and poor connectivity contributed to the additional time that teachers were spending with students after classes and in the evenings. The school board has recognized the significant contribution of time given by the technology resource teachers, but there is no apparent recognition of the significant time expenditures of others. While it is reasonable to expect that professional teachers work with their students and engage in learning and planning outside of the student school day, it appears that much of the program that led us to designate this school as an innovative school is largely dependent upon volunteerism.

Leadership

The model of leadership that appears to exist at this school is consistent with models that are currently viewed as being most appropriate for successful educational change (Darling-Hammond, 1996; Fullan,1998; Hargreaves.& Evans,1997; Leithwood and Duke,1998; Leithwood & Jantzi, 1997; Leithwood, Leonard,& Sharratt, 1997; Mitchell, Sackney & Walker,1996; O'Toole, 1996; Sheppard, 1996; Sheppard & Brown, 1998). Emphasis is placed on cultural, collaborative approaches in which teachers and other educational stakeholders are viewed as partners. In such a model the school administrator is actively engaged as a facilitator such that the leadership capacity of others, particularly teachers, is enhanced. Essential components of such an approach to leadership include staff involvement and commitment, community partnerships, and the building of the school's capacity to maintain or improve performance based on experience. At Genesis Academy, 81% of the teachers viewed the principal as providing a great deal of leadership for school change. However, they also recognized the leadership role of others, as well. Approximately 60% of the teachers recognized that leadership was distributed among teachers that were assigned specific roles such as membership of the school's technology committee. Additionally, 67% perceived that a great deal of leadership was exercised by the entire school staff. 62% perceived that students were leaders in the school and 20% recognized the leadership contributions of various community groups and school district office personnel. While the school principal admits that he has not had direct involvement with projects or initiatives related to ICT, he has been supportive, and he notes that the success of ICT implementation at Genesis Academy is dependent upon team leadership that exists within the school.

The following comment is indicative of the principal's support for technology in the school:

> I see technology playing a big part and will continue to play a big part in changing how people live. We have absolutely no control over that. If it's going to happen, it's going to happen. You can battle it and say I'm not going to do this and I'm not going to do that, but the more you battle the further behind you'll go. It's a fact of life, you hear a lot of people say about how things were better back then and this kind of stuff and most likely in their eyes, they're absolutely right. But technology is going ahead and to keep up with it, we're going to have to put some effort into it. It's no question about that.

This support has not translated into the principal's direct involvement in the promotion of technology. However, it is quite clear that he is aware of the progress that has been made in this area. He attributed much of the progress to the expert leadership of the technology resource teacher, and he appeared to have confidence that such leadership will continue:

> All students and teachers recognize the leadership provided by the technology teacher. She is responsible for providing the technical advice, professional development to teachers, and community training to parents and other community members. She chairs the technology committee that is responsible for setting directions for ICT progress in the school.

When asked about scheduling classes in the computer lab, something about which he had expressed considerable concern because of limited resources, he revealed his absolute trust in the leadership ability of the technology resource teacher:

> We usually try to maneuver the schedule such that we will make an excellent school. And I have nothing to do with it again. I'm just talking from an administrative point of view. Our technology person, she's very accommodating in terms of.... If she's sees people wanting to use technology as an instrument to supplement the text or whatever, she'll certainly bend over backwards to make sure that she got the proper software installed and that kind of thing so that everything is ready to go.

The technology resource teacher verified that she has been assigned a leadership role in the school and that she has further distributed that role to a team of teachers:

> I am the leadership in this school, which is great because somebody needs to be the leader. But once the technology committee was formed then it took a lot of pressure off me because I

knew I wasn't making the decisions, but I was before that because the principal gave me free reign really, not free money, but free reign. So, all the decisions were mine. So, we [the technology committee] do meet fairly regularly. Sometimes they're not formal meetings because sometimes I just have to go around and say this is an issue, "What do you think?" Sometimes they're informal. We make decisions about purchasing and about raising money. We have our own bank account and we make decisions about approaching the board. We don't purchase anything, without having two people to sign on our account.

One of the technology committee members confirmed that the principal's confidence in respect to the leadership strengths of the technology resource teacher is well founded:

She has been exceptional in the leadership role with our technology. She was very, very interested in it and wanted the school improving technology and she's brought it step-by-step. She lived and breathed it and just about slept in the school in the technology lab. It's more than just a job to her and she loved it. She's not doing something that she hates to do, she really loves it and she spurred it all on. So, she formed it and got the committee off the ground.

Student leadership is also emphasized in this school. As noted above, 62% of the teachers felt that students provided a great deal of leadership in the school. The principal praised the active role of the student council. The principal was quite eager to talk about the student leadership group that he referenced as "an arm of student council". This group has been active at the provincial level and hosted a provincial leadership conference two years ago. The principal is convinced that students are comfortable discussing school issues with him and that they have extensive input into school decision making.

The grade 12 students that were interviewed felt that the all-grade school environment provided unique leadership opportunities for all students. For example, they noted that the school has an established tutoring program that allows high school students to tutor elementary or junior high students. This program provides leadership opportunities for the high school students and needed assistance to the tutored student. Also, tutors are paid a small fee that is to go toward tuition costs related to their post-secondary studies. Finally, teachers and students recognized the significant leadership role played by a number of students in the professional development of teachers in respect to ICT.

The school council composed of teachers, parents, students, and community representatives is also quite active in school leadership. In reference to technology, they are leading the lobby to have the telecommunications infrastructure up-graded in the school and the region.

The school board's leadership has also had a favorable impact upon technology implementation at Genesis Academy. They have supported the implementation of ICT across the curriculum by making it an essential goal of their strategic plan. Also they have accepted the recommendation of the district committee on technology to formally recognize the position and title of *Technology Resource Teacher*. Even though the Department of Education has not formally recognized such a position for bonus salary purposes, the school board has agreed to support the position through recognition and through some other small rewards such as professional development opportunities that they can provide. The technology resource teacher at Genesis Academy is chair of the district committee on technology, and she praised the school board's decision in this regard:

So, we wanted to at least say that we know you're there and we recognize you and we appreciate your leadership role.... They're recognizing it, that's as far as they're going right now, and they're also trying to provide little things. We're even hoping to choose a few teachers to attend some national conferences and things like that. So, there are things that we can't do, like to grant department head status with pay increases and things, but there are other things that we can do and we are trying as a committee at the District level to try to do the little things. Just the recognition alone makes some people feel better.

The principal believes that the school is well connected to all the communities that it serves and is viewed as the hub of all activities for students. This view was supported by one of the teachers:

We are the social fabric and fibre of this whole [regional] community. So, it gives opportunities for things that aren't normal in urban areas and aren't normal even in small different rural areas.

As a result of the leadership role that the school plays in the community, it receives a great deal of community support. For example the grade 12 students recognized that,

the community gets really involved in the school. Take the Gym for instance, everything, like the backboards and the oak paneling, was done through a group out here called the "Basketball Moms".

The students also noted the support provided by the public library:

We work with the public library.... The librarian brings in books or articles and stuff that we can use in the school.

In addition to the recognition that school leadership was distributed throughout the school and the community, all groups interviewed also noted the positive energy generated through the existence of a collaborative environment. The extent of the collaboration between teachers and students, and the reliance upon student leadership in respect to learning as it relates to technology are revealed through the following student comment:

Mary was sitting down to a computer, and Mr. Paul was there. He was looking to get into a certain program, or he was wondering what was going on, he leaned over and he asked her for help. So, when it comes to computers, they don't always see themselves as experts.

A senior high school teacher corroborated this view that a collaborative environment exists at Genesis Academy:

I think all staff members work together tremendously. You can always find a lot of teachers to pull together and help you no matter what you are doing.... The whole staff without hardly any exception takes part, and everyone pulls together.

Morale at the school appears to be rather high among students, teachers, and the community in general. The grade 6 and 7 students were proud of their school. They boasted that they were well known as leaders in Basketball. Also, they were aware of and were quite proud that many students received scholarships in their school. A grade 12 student stated that she had attended five other schools in other areas and that Genesis Academy is the best. "Everyone gets involved and teachers and students have a good relationship." A teacher echoed the same positive thought: "This is an exceptional school. I love to come to work every day." The principal was also proud to be associated with this school and felt that morale was quite high:

I know we get along very well. We give each other a hard time a lot, which is a good sign really, in that you could joke around and you could play around and that kind of stuff with everybody. A lot of people are involved in different things. A lot of teachers are certainly involved in the whole idea of student participation. There are extremely good students in here in this school in terms of student leadership and that makes it much easier for discipline. It makes it much easier for teachers to get the work done. If they wanted to sponsor a particular activity then it's no problem for students. Students are there to get the job done.

The grade 12 students were quite enthusiastic about the relationships between teachers and students in the school. One student commented:

It's not one sided. They're not just our teachers. The same thing exists if we meet them outside of school. It makes you feel that much better about going to a teacher and asking for help.

They were pleased to describe examples of their teachers' active engagement in school activities beyond

the classroom, such as playing volleyball with students and engaging in Christmas frolics, or Spring Fest activities. One student described the following as typical of school life:

> At the Spring Fest last year, we had one of our teachers, Mr. Jones. When he entered the gym, students went up to him and they bombarded him with water balloons and then he took off and they ran after him. That's what our teachers do; they get involved, too. It works both ways. That's the way our relationship is with teachers here.

The Integration of ICT in Teaching and Learning

Ninety-five percent of the teachers believe that ICT is having a significant impact on the students' learning activities. The importance placed on ICT for all students is further demonstrated by the composition of the membership of the technology committee that insures representation from all areas of the school from kindergarten to grade 12. This committee has had a formal written technology plan related to student learning outcomes since 1996. They have met each year to evaluate their progress relative to that plan and to formulate new plans. The grade 2 teacher reported that all projects that she planned for students, including GrassRoots projects, were consistent with the school's and district's articulated learning outcomes. One basic objective related to computer technology is that all students will begin word processing in grade 2 and will develop appropriate skills throughout the grades. The technology resource teacher reported that by the time that students complete grade 6, the majority, perhaps as high as 90% can type 20 words per minute. All grade 10 students are expected to complete their examinations using a word processor.

All primary and elementary classrooms have several computers. These are older computers (286's and 386's) that have been donated through SchoolNet's Computers for Schools program. They are used primarily as writing centers. In addition to scheduled writing center learning activities students can use these computers during class time when they have completed other work, in the morning before class, and during recess and lunch breaks. Additionally, all students from kindergarten to grade 12 are scheduled in the computer lab. Junior and senior high students are scheduled regularly in the computer lab for courses directly related to the development of technology related objectives. Additionally, they are scheduled specifically for units of study in other subject areas such as mathematics, science, or language. The technology resource teacher perceives that, currently, up to 90% of the teachers are interested in integrating technology across the curriculum; the biggest drawback to that, she observes, is their getting access to the lab. While she believes that another lab would be of significant benefit to the cause of advancing ICT, she expressed a concern that placing more computers in classrooms may not be the correct approach. The technology committee placed computers in junior high classes, but these were not used effectively.

The importance of ICT to students was clear. For example, when asked what changes they had noticed in the last few years the first response from the grade 6 and 7 students was "Our gym is bigger." The second response was related to the remodeling of the computer lab so that now "there's Internet on every computer." To place second only to the gymnasium, the home of the school basketball team, that has shaped the school's identity, is quite significant. The importance of the change was further demonstrated by the fact that all students were aware that this improved Internet connectivity resulted from the installation of the satellite dish at the beginning of this school year. Several of these students indicated their enthusiasm for using the Internet as a tool for learning. One student commented, "I love the Internet." A second student stated, "The Internet is good to get lots of information." Similarly, the grade 3 students were quite excited about their active engagement with the Internet and were anxious to talk about it. The enthusiasm for their work was evident from the degree of energy created as they shared accounts of their last years work on the Grassroots projects on fairy tales, dinosaurs, and bears. One student commented,

> We did all different kinds! We made up our own fairy tales and we passed it along to other schools and our teacher. One school was from Mexico.

They had exciting ideas about the projects that they wanted to pursue this year. One student wanted to develop a web site about the Internet itself, another wanted to search the web to find out about orcas, and

yet another wanted to learn more about the Titanic. Another student excitedly stated that,

> There are thousands of things that I would like to look at, like the Titanic, hear your heartbeat and all that stuff.

The GrassRoots program has played a significant role in integrating ICT into the students' curriculum at this school. Over two school years, the school has had eight GrassRoots projects sponsored by various teachers at all grade levels. In response to a question related to awareness of GrassRoots, one grade 12 students stated,

> Oh definitely. You should hear my cousin telling me about how they did it with a whole class and one Internet.

Technology is becoming institutionalized in this school. The principal stated:

> Well, what I'm finding is that it's just becoming one of these things like reading and writing now. I find technology is just becoming one of these things that kids are just doing, like it's no big deal to them.... It's like everything that's introduced to a curriculum that evolves into something that eventually just becomes part, it's like the French program or the English program or like anything else-- it just becomes part of you and it's available to everybody.

The degree of integration of technology into the school environment is further revealed through another of the principal's observations:

> At one time [there were] students who loved to get in the computer lab to see what kind of a mess they could make on the hard drives and stuff like that, whereas, now they got a whole new respect for it. Now they see it as a tool that they can actually use, now there is no idle time. They go in there now and there are things that they can do with a computer, so why mess it up.

Not all schools have progressed to the level of this school. In many schools, one of the primary reasons for not providing students access to computers and the Internet outside of scheduled classes is the potential for vandalism. At Genesis Academy, students have access to computers throughout the entire day and many evenings. At these times students can play computer games or work on an assignment. If access were restricted to scheduled classes then it would be limited because one computer lab serves all students. The principal noted that,

> you almost need a note from God if you want to get in there very little during the day.

Professional Development

Professional development activities that have influenced the implementation of ICT at this school includes: training provided through the Federal Government Bridges program; just-in-time on-site support and short courses provided by the technology resource teacher; continuing education opportunities offered by various post secondary institutions; training, support, institutes, and conferences offered through STEM~Net; district and Department of Education planning teams; and workshops for adults and children sponsored by various groups.

The technology resource teacher has acquired skills in technology as a result of a variety of experiences: courses at a public technical college, a technology education graduate degree program at Memorial University, a week-long summer institute sponsored by the Department of Education, an information communication technology conference sponsored by STEM~Net, and membership on provincial and district technology committees. Working with the technology committee at the school level, she and other team members have encouraged others to get involved, and she has followed up by providing short courses and just-in-time training for teachers as required.

The grade 2 teacher described the professional development program that got her interested in computer

technology. She was asked to assist a district program coordinator in the delivery of a technology summer camp for primary children. She learned a great deal at this camp, and has been able to build on her enthusiasm and newly found skills through courses offered by the technology resource teacher. Also, she and two of her colleagues have recently had the opportunity to attend a week-long Windows NT course sponsored by her school board.

STEM~Net has played a major professional development role in the area of computer technology. Aside from the train-the-trainer model that STEM~Net has employed, whereby each school was to have one trained resource person, two teachers reported that simply being given an Internet account and free Internet access gave them the resources that they needed to learn. The support offered through the STEM~Net team has been invaluable to several of the teachers in this school. The introduction of GrassRoots has generated the critical tension and the experience required for more professional learning to occur.

As a result of the Bridges program, teachers, school children, and adults have been able to avail of free training. A grade 12 student described the observed success of the Bridges program:

> There's a class after school for parents and children who want to get familiar with the Internet. It works out pretty well. Almost every evening, you'll see the Moms and the Dads sitting down with the children and they seem to like it, too. I think there was a course for teachers. My Mom has done about three courses here after school or in the evenings. And the same thing exists for teachers who might be interested in different areas of it. I guess some of the primary teachers aren't really as much concerned about big, heavy-duty things. They want programs for their students and they'd like to know what Internet sites are good for their students.

The technology resource teacher summarized the importance of professional development quite forcefully:

> I believe that teachers can't expect students to use technology if they don't use it themselves. I believe teachers must be role models to use the technology. So, that's certainly something. So, providing professional development even if it's psychological professional development has to be the number one priority of the Department of Education in my opinion. So, like from a SchoolNet point of view for example, the more things that they can do the better, because once you hook them, you have them for the most part as long as you don't overwork them. But if we're talking about most teachers out there, you just need to hook them and whatever you could use to hook them means you'll hook their students.

Summary and Conclusions

The researchers found that individuals at Genesis Academy were unable to make a distinction between STEM~Net and SchoolNet programs. The groups associated with these two programs have developed a seamless service that have had a positive impact on teaching and learning at all grade levels at Genesis Academy through initiatives targeted at students and teachers, the improvement of the technology infrastructure and resources, the classroom use of ICT, and the professional development of teachers.

At Genesis Academy, connectivity continues to be a source of frustration; however, the SchoolNet Direct Satellite Program has resulted in major improvements in that regard. Also, the toll-free long distance connections make connectivity somewhat affordable. As a result, teachers and students have been encouraged to continue their efforts toward further integration of ICT in the classroom.

The GrassRoots program has provided an incentive for the development of instructional units that have facilitated increased teacher and student use of ICT in the curriculum. The financial rewards provided to the school for engagement in GrassRoots projects have allowed the school to add to their ICT resources, and the support and professional development opportunities provided by STEM~Net and SchoolNet personnel have been major positive influences.

In contrast to other less successful schools that also had the SchoolNet and STEM~Net supports

available to them, Genesis Academy appeared to seize opportunities to avail of any sources of leadership available. As a result, the successful implementation of ICT into the teaching and learning environment at Genesis Academy appears to have been positively influenced by the collaborative leadership model that has been fostered. Teachers, students, parents, school administrators, school district personnel, community members, businesses, STEM~Net and SchoolNet personnel have been involved in both the planning and implementation of ICT integration into the teaching and learning environment. While the leadership provided by technology resource teacher was invaluable to the successful development and implementation of innovative ICT projects that impacted the learning environment, she was quite emphatic that the success of her efforts were largely dependent upon the collaborative leadership environment and support of the above noted groups. Certainly, a significant lesson of this case study is that large scale university or government initiatives can have a major impact on the use of ICT in teaching and learning environments in schools if leaders of these initiatives engage with other school and school system leaders to deal with local issues and concerns and if all are willing to adapt strategic plans as a consequence of successes, failures, and the unexpected.

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Abstract

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ID Number:	EDU9920
Title:	Information Technology, Innovation and Success in a Small Rural.School
Author:	Bruce Sheppard, Wilbert Boone, Ken Stevens
Organization:	Memorial University of Newfoundland
Year:	1999

Abstract: This paper reports on a case study of one rural school that has been recognized as an innovative school in respect to the integration of information and communication technology (ICT) in the teaching and learning environment. This case study is part of a larger study to assess the impact of two outreach projects directed at the implementation of ICT in K-12 classrooms. Findings suggest that while the outreach projects have positively influenced the implementation of ICT, the factor that distinguishes this one school from other less successful project schools is their collaborate model of leadership.

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