Creating a Culture of Innovation in Canadian Schools

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Since its inception in 1996, the GrassRoots Program has been instrumental in facilitating the integration of information and communication technologies (ICT) into the classrooms of Canadian schools. By linking the GrassRoots Program to the school curriculum and providing incentives for teachers to engage students in the process of co-creating electronic curriculum resources for the Internet, it has been influential in transforming classrooms into authentic centres of learning. There is overwhelming evidence supporting the concept that the GrassRoots Program is a powerful connector between ICT and new teaching theories.

This paper provides an overview of innovation, a background to some of the challenges associated with large-scale innovation in the Canadian K-12 school system and the findings from a collection of 16 case studies conducted in innovative schools in Canada. An analysis of the data contained in the case studies indicates that the GrassRoots Program is having a positive impact on the diffusion of ICT in the classrooms of schools that are members of the Network of Innovative Schools (NIS), and it is making a significant contribution to the development of a culture of innovation. The existence of GrassRoots projects has also increased the capacity for innovation by empowering and enabling the schools and teachers to work on multiple innovations simultaneously. Also, there is sufficient evidence to show that GrassRoots has had a major impact on: teacher professional learning; teacher technology skill development; student technology skill development, student employability skill development; access to teaching resources; leadership opportunities; and school growth and development.

Introduction

In 1996 Industry Canada's SchoolNet launched an innovative program to stimulate, among other things, the integration of information and communication technologies (ICT) into the classrooms of the nation. The GrassRoots Program[1] offers funding to schools for the creation of innovative, Internet-based, collaborative and interactive electronic learn-

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ing projects. To qualify for funding these projects must be relevant to the school curriculum and lead to the creation of Canadian content, designed and implemented by teachers and students, and published on the Internet. They must also foster the acquisition of academic, employability and technology skills in Canadian youth, by integrating information and communication technologies into learning activities, and facilitate increased connectivity and training opportunities.

In 1998 Industry Canada's SchoolNet, in partnership with the Canadian Association of School Administrators (CASA), launched a pilot project, the SchoolNet Network of Innovative Schools[2] (NIS). The objective of this program is to identify innovative schools in the K-12 system that are successfully integrating ICT into the curriculum. The purpose of the Network is, among other things, to establish a 'network of schools' that are capable of learning from one another and mentoring other schools in online learning communities. To date, over 100 schools have been selected to be part of this Network and they have been provided with a modest financial grant ($10,000 per year for three years) to facilitate their innovation plans.

Purpose

Based on a more extensive study reported elsewhere (Dibbon 2002), this paper will illustrate how the GrassRoots Program functions in NIS schools and provide evidence to show that GrassRoots projects stimulate learning and innovation in these schools. Specifically, this paper will:

- demonstrate how the Grassroots Program facilitates the movement of innovative educational practices beyond isolated pockets of excellence to reach a much greater proportion of students and educators;
- identify how educators in innovative schools use GrassRoots projects to prepare students for learning so that they are capable of acquiring pertinent new skills and knowledge throughout their lifetime;
- identify how the GrassRoots Program has made a significant contribution to innovation in the selected schools.

Methodology

The study summarized in this paper followed a case study design. Stake (2000) identifies three types of case studies. First, there are 'intrinsic case

studies', studies undertaken because the researcher wants a better understanding of one particular case. Second, there are 'instrumental case studies', where a particular case study is examined mainly to provide insight into an issue or to redraw a generalization; the case is of secondary interest. Third, when there is less intrinsic interest in one case a researcher may jointly study a number of cases in order to investigate a phenomenon, population or general condition. This type of case study is referred to as a 'collective case study' and it is really an instrumental study extended to many cases. This study followed the 'collective case study' methodology.

A representative sample of 16 NIS schools representing each of the Canadian provinces and territories, elementary and secondary schools, from urban and rural communities was selected, in consultation with GrassRoots officials responsible for overseeing the GrassRoots Program. Interview questions were developed and field-tested, and minor adjustments were made to the wording of some questions. Telephone interviews were then conducted with administrators ($n = 16$) in each of the schools and at least two teachers who were involved in GrassRoots projects ($n = 34$). The interviews were recorded and then analyzed using the constant comparative method.

Background

INNOVATION AND THE EDUCATION SYSTEM

As a result of a fast-changing global economy, Canadian schools and school districts are facing increasingly turbulent times (Dibbon 1999; Rait 1996; Stoll and Fink 1996; Leithwood and Aitken 1995; Prestine 1994; Leithwood, Janzi, and Steinback 2000). Changes in our economic environment brought on by globalization, government restructuring, and the rapid growth and expansion in information and communication technologies has made it necessary for Canadian schools to be innovative in their approach to preparing students for success in this new economy (Canadian Federal Government 1995, and 2001; Conference Board of Canada 2001a; Conference Board of Canada 2001b; Laferriere 2001; OECD 1993). Not since the waning of the 19th century when North American educators had to deal with rapid growth due to immigration and the arrival of the industrial revolution (Campbell, 1987; Bolman and Heller, 1996), has the teaching profession had to cope with such broad-based, societal change. Today, we are in the information age and much of the change and innovation in schools is focused on the successful integration

of information and communication technologies into the learning environment. While there have been many examples of individual schools that have been innovative in their use of ICT to enhance teaching and learning, the challenge for system-wide innovation remains.

The standard definition of innovation is 'the adoption of an existing idea, practice or object that is perceived as new by an individual or other unit of adoption' (Rogers 1995). In this definition, whether or not an idea is objectively new as measured by the lapse of time since its invention is of little concern. The perceived newness of the idea for the individual, group or organization determines the reaction to it. If the idea seems new to the individual or group then it is an innovation (Rogers 1995). In the academic literature, there is a clear distinction made between innovation and invention – the adoption of a new idea as opposed to the creation of a new idea. However, in this era of rapid change, the line between the two appears to have blurred, and innovative organizations are both inventing and adopting new practices. As a result, in today's world innovation has come to refer to both (Borins 2002).

In recent times, innovation has become a topic of great interest to leaders in both the public and private sectors. In the private sector, the rapid development of new technologies has provided opportunities for firms to launch new products, transform their production processes, and do business in new ways. For many industries, innovation is necessary in order to ensure economic competitiveness and sustainability. While public sector organizations (including the education sector) have traditionally been shielded from the pressures of their private sector counterparts, no longer can they claim to be exempt from the pressures of global competitiveness.

Innovation in education has never been an easy task, primarily because of the conservative nature of our public education system (Levin 2001). While the past half-century has been marked with numerous attempts to innovate and reform our system, in terms of the impact on teaching and learning, most of these efforts have failed miserably (Fullan 1995; Levin 2001). While many of these initiatives (e. g., the human relations movement of the 1940s and 1950s, the curriculum reform movement of the 1960s, the implementation studies in the 1970s, the effective schools movement in the 1980s, and the restructuring initiatives in the 1990s) delivered short-term solutions, they provided no panacea. From an innovation adoption perspective, by the 1980s we knew a fair amount

about the factors associated with introducing a single innovation but from a societal point of view it was too little too late (Fullan 1995).

During the 1990s, the pace of change accelerated and it was no longer sufficient to deal with innovations one at a time. The ante had been upped (Fullan 1995) and as the country prepared to move from a traditional resource-based economy to a newer knowledge-based economy there were numerous calls from both government and business for innovation and change to our education system, to ensure that the next generation of Canadians to graduate from the nation's schools would be equipped with the skills and knowledge required for success in this new economy. For example, an 1993 OECD Report stated (OECD 1993, 9):

> Only a well-trained and highly adaptable labour force can provide the capacity to adjust to structural changes and seize new employment opportunities created by technological progress. Achieving this will in many cases entail a re-examination, perhaps radical, of the economic treatment of human resources and education.

The Council of Ministers of Education (CMEC), a creation of the provincial governments that has no formal power over any of the provinces but does play a co-ordinating role with respect to educational policy changes, was also quick to identify the need for changes to our education system. In *Joint Declaration: Future Directions for The Council of Ministers of Education, Canada* (1993) the chairman noted:

> We are well aware of the challenges to the education systems posed by our rapidly changing world: globalization of the economy, openness with regard to other cultures, pressing needs for skilled labour, and technological advances that are having an impact on our daily lives as well as the job market. These changes require constant adjustments to our educational practices to ensure high quality, accessibility, mobility, and accountability.

The *Third Annual Innovation Report* by the Conference Board of Canada (2001a) claims that innovation is one of the most important means to improve competitiveness, generate wealth, create jobs, and sustain our high quality of life. As such, creating a fertile environment for innovation is the responsibility of government, business, investors, the financial community, academics and individual Canadians. In *Knowledge*

Matters: Canada's Innovation Strategy (2001) the Government of Canada recognizes that there will be an ever-increasing demand for a well educated and skilled workforce in all parts of the economy and in all areas of the country. The report continues by saying, to accomplish these goals 'our learning system must be strengthened' (Canadian Federal Government 2001, 2). In the Social Studies and Humanities Research Council's (2001) (SSHRC) recent call for proposals on Initiatives for the New Economy (INE Grants) it claims education is a key factor in equipping young Canadians with the knowledge and skills to succeed in a new economy. Clearly, encouraging innovation in the nation's schools to ensure that students develop the skills required for success in the new economy is of national importance and stakeholders have placed high priority on achieving this goal.

During the 1990s policy makers recognized that one of the primary functions of education in our society has been one of cultural cohesion and stability – aimed at perpetuating cultural values, knowledge, standards, and practices. In essence, for many years the system was more concerned with preserving the status quo than it was with innovation and change. These same policy makers also rediscovered that education could be a powerful and essential instrument of innovation and social change. In fact, one could argue that a central motive behind many current educational reform initiatives is the belief that education has a critical role to play in strengthening the country's capacity to meet the challenges of the future. Education is now so important that governments and industry are major players and education is seen as too important to be left solely to the judgment of educators.

There have been many responses to the call for innovation but as the experiences of the 1970s, 1980s and 1990s have shown, the integration of a new idea into general practice is often very difficult. Even innovations with obvious advantages require a lengthy period, often many years, before they are widely adopted. Although educators have implemented many innovations over the past two decades it is apparent that widespread acceptance is problematic. Many educators claim that taking an innovation to 'scale' (Elmore 1995) or speeding the 'diffusion time' (Rogers 1995) is extremely difficult due primarily to what Fullan and Steilgerbauer (1991) calls 'the school's incapacity for change.'

Recognizing this difficulty in taking an innovation to scale, Industry Canada's SchoolNet has developed a number of programs designed to accelerate the uptake of ICT innovation throughout the Canadian K-12

school system. This paper examines the impact that the GrassRoots Program has had on innovation in a Network of Innovative Schools and identifies how the GrassRoots Program has contributed to nurturing a culture of innovation within these schools.

GRASSROOTS: THE DIFFUSION OF AN INNOVATION

How can we ensure that good educational practices that impact positively on teaching and learning, like the Grassroots Program, move beyond isolated pockets of excellence to reach a much greater proportion of students and educators? The problem of *scale* is not a problem of the general resistance or failure of schools to change. In fact, most schools are constantly changing – adopting new curricula, new assessments, new schedules, changing decision-making mechanisms and sundry other modifications (Elmore 1995; Fullan 1995). However, when it comes to changing the *technology of schooling,* replicating this success on a larger scale has proven to be a challenge. Technology of schooling refers to the knowledge of the craft of teaching and learning that teachers need to possess so that currently modern thinking about education is manifested in teaching and learning processes.

The GrassRoots Program is aimed at encouraging teachers to move beyond traditional ways of teaching to incorporating more innovative approaches to teaching and learning in their day-to-day work. Generally these innovative approaches are new teaching strategies that acknowledge a general shift in thinking about education, a shift that advocates moving away from:

- a teacher-centred classroom to a learning-centred classroom,
- a system that relies on single sense stimulation to a system that enables multiple intelligences,
- a single media environment to a multimedia environment,
- isolated work to collaborative work,
- isolated artificial content to authentic real world experiences, and
- information delivery to information exchange.

The GrassRoots Program provides for a powerful connection between ICT and new educational theories about teaching, and learning (e. g., constructivist learning theories, project-based learning, and multiple intelligences). Making the connection between these theories and the integration of ICT is essential to the successful introduction of new teaching strategies involving the integration of ICT into the classroom.

To facilitate the diffusion of new ideas about teaching and the use of ICT across the curriculum (GrassRoots Program), it is important to have a strong external standard for innovative teaching practice. In this instance, the external standards (developed externally to the school) can be represented as the criteria that individual teachers use to guide their project development. The external standard is important because it institutionalizes the idea that professionals are responsible for looking outward at challenging conceptions of practice, in addition to looking inward at their values and competencies (Elmore 1995). By developing advanced forms of collaborative and interactive electronic learning projects and making them available to teachers on the Internet, a standard for practice is being set, and the online database of projects provides an informal way of communicating norms of good practice to others. The important thing about these norms is that they inform teachers' ideas about practice and they carry with them a high degree of professional authority.

In the past, and to a large extent today, educators tended to be somewhat naive about how to ensure the large-scale diffusion of an innovative idea. Given what we know about the conditions under which teachers work (Bluestein 2001; Elmore 1995; Fullan 1995) and the generally weak incentives that exist for teachers to embrace ideas that are generated external to the school and classroom, this is not surprising. Just presenting the idea and assuming that because it is a good idea others will adopt it, does not work. Changing teaching practice, even for the most dedicated and committed teachers, can be a slow and arduous process and teachers have to feel there is some compelling reason for them to alter their practice. The GrassRoots Program's linkage to curricular change and financial incentives for teachers to engage students in co-creating electronic curriculum resources for the Internet, and thereby providing a process that allows for the reproduction of classroom successes, has been influential in transforming some classrooms into authentic centres of learning.

An analysis of the data contained in the case studies upon which this paper is based, as well as earlier studies completed by Laferriere (2001) and the Conference Board of Canada (2001b), indicates that the GrassRoots Program is having a positive influence on the diffusion of ICT in the classrooms of schools that are members of the NIS and making a significant contribution to the development of a culture of innovation in the schools.

Findings and Analysis

ASSESSING INNOVATIVE CAPACITY

There are at least three stages in the adoption of any new technology (Chapman 1996). The first stage is the reproduction stage – a stage where the primary concern is with using the new technology to do 'old things in new ways.' Using PowerPoint to replace overheads is a classic example. Until now, much of the use of technology in schools has been largely concerned with the reproduction of current pedagogical practices. In stage two, the newly available technology leads to new ways of teaching and learning, and supporting the administration of education (Chapman 1996). Getting to stage two is easier and the innovation is more significant if people (teachers) are able to work collaboratively as members of interactive networks. The creation of a professional network (e. g., NIS) to support the practices of teachers who are in the process of changing or modernizing their teaching practices, has provided leverage for change in the way some teachers approach their work. There is considerable evidence from the case profiles prepared for this study that NIS schools are working comfortably at this level of adoption.

The final application of technology (stage three) is the transformation of education or the movement from traditional types of schools to open model schools (Stevens 1999; Stevens and Moffatt s. d.). The open model school is based on the premise that schools integrate with one another for at least part of a school day. The open model of the school is also grounded in the application of information and communication technologies to teaching and learning and the construction of networked classes for the purpose of facilitating the creation, transfer, utilization and documentation of knowledge. As innovative schools become more innovative, they will be well positioned to lead this transformation.

Changes of this magnitude cannot occur unless there are committed groups of teachers and administrators who see the urgency for this transition and are willing to champion the initiative. Earl and Lee (1998) in their work on school improvement in Manitoba observed a pattern of activity that they have characterized as 'a cycle of urgency, energy, agency and more energy.' Something stimulates a group of educators to feel a sense of urgency about changing the way they do business. The urgency is experienced as a surge of energy that results in either productive action or dysfunctional behaviour. When the conditions are right, for example when a school receives the support of GrassRoots or the NIS, these bursts

of energy lead to an upward spiral with an increased sense of agency and productivity. This support, in time, releases more energy and the cycle continues. When support is withdrawn there is a greater chance that the energy will spiral downward resulting in anger and disillusionment, and a previously innovative school risks loosing its innovative status. The schools in this study have realized a sense of urgency about making changes to the pedagogical process and the support provided by GrassRoots and NIS has been instrumental in producing an upward spiral of energy with an increased sense of agency.

Finally, there is ample evidence that the GrassRoots Program has contributed to an increased capacity to integrate technology into the teaching and learning environment in these innovative schools. There are many instances where technology integration began with a single teacher and a single GrassRoots project but with the leadership and coaching provided by GrassRoots teachers and co-ordinators, the GrassRoots Program in these schools has grown and is continuing to grow. For example, in many of these schools teachers are working on more than one project and in many schools up to 50% of the teachers have experience working with GrassRoots. Also, some of the projects are very sophisticated and involve multiple teachers and multiple classes of students, and in some schools all students are involved.

The existence of GrassRoots projects in these innovative schools (NIS) has increased the capacity for innovation by empowering and enabling the schools and teachers to work on multiple innovations simultaneously. As we make the transition to a knowledge-based society, these programmes provide the necessary support and encouragement that is required for these schools and teachers to be innovative in their use of technology for teaching and learning.

HOW GRASSROOTS HAS INFLUENCED INNOVATION

The GrassRoots Program has had a positive impact on the ability of NIS Schools to be innovative in their approach to the use of ICT. Based on the case studies reported in this study, the leverage from the GrassRoots Program lies in an increased capacity for: teacher professional learning; teacher technology skill development; student technology skill development; student employability skill development; access to teaching resources; leadership opportunities; and school growth and development.

1. Teacher Professional Learning. Clearly, the GrassRoots Program is an innovative programme that is stimulating professional learning oppor-

tunities for educators in innovative schools. In fact, in some schools there is evidence that a professional learning community (Laferriere 2002; DuFour and Eaker 1998) is developing. In a professional learning community educators acknowledge that the traditional guiding model of education is no longer relevant in our knowledge-based society and they embrace ideas that are somewhat different to those that have guided schools in the past. As one of the teachers in a K-12 school claimed, 'The amount of collaborative learning taking place between students and teachers has surpassed what could ordinarily be accomplished through traditional teaching and learning strategies.' The GrassRoots Program provides strong incentives for teachers to re-think their traditional approaches to teaching and their delivery of the curriculum. The learning resources teacher in a large urban high school claims that, 'teachers are empowered to abandon traditional ways of teaching in favour of more innovative approaches and this has stimulated many of them to evaluate their own philosophies and practices in teaching.' Participants from each of the schools confirmed that teachers who were engaged in the GrassRoots Program were more inclined to adopt innovative teaching methodologies (e. g., project-based learning) and integrate them into their day-to-day teaching.

2. Teacher Technology Skill Development. Not surprisingly, when teachers and students were engaged in GrassRoots projects they increased their capacity to successfully utilize ICT. The technology teacher at a mid-size urban high school explained how his school developed and maintains an up-to-date Technical Skills Inventory. 'It's simple really – a checklist of skills ranging from the simple to the more complex, that provides a guideline to the skills that teachers and students need to know before they tackle specific projects.' All teachers and administrators reported that as a result of their involvement in GrassRoots projects, teachers were more confident in their use of ICT in the classroom. For example, teachers indicated that the GrassRoots experience motivated them to learn website construction skills, how to use digital cameras, how to do multimedia presentations and how to organize students to work in project teams.

3. Student Technology Skill Development. Reports indicated that students were enthusiastic about learning and applying ICT to their schoolwork. Teachers spoke convincingly of how GrassRoots projects provided opportunities for students to improve their technical skills (e. g., website

construction, email, digital photography, multimedia productions, and robotics) through working with other students and teachers on authentic learning problems. In an urban elementary school the learning resources teacher spoke confidently about how technology was integrated into all grade levels, with the exception of the kindergarten children. 'Every student has his/her own website. This initiative starts in Grade One when the children learn how to set up their site and post artwork and stories. It continues to each subsequent grade level so that a portfolio of work traces their progress up to Grade Six.'

4. Student Employability Skills Development. There is sufficient evidence that the skills students are acquiring through the project-based approach to learning being practiced by teachers who participate in GrassRoots projects are the types of skills that are outlined in the Employability Skills Index developed by the Conference Board of Canada[3] (2000). The acquisition of employability skills is critical if students are to be prepared for success in the 21st century economy. In these innovative schools, students and teachers work seamlessly with technology (often in the form of GrassRoots projects) to help develop ICT and other fundamental, collaborative and personal management skills that are critical for success in a modern workplace. This project-based approach towards teaching and learning gets students involved in their own learning and provides opportunities for teachers and students to solve problems as members of collaborative teams. While some schools are able to involve all teachers and students in this process, there are still many challenges to meet before this type of teaching and learning is accepted and adopted in all schools. While there is clear evidence that there is a synergy between NIS and GrassRoots, there remain some challenges to accelerating the rate of diffusion of innovative practices within and between schools and districts.

5. Access to Resources. Innovative teachers need classrooms that are well equipped with the latest technology, as well as access to training in the appropriate uses of the technology. There is unanimous consent that the financial awards accompanying selection to the NIS, and the successful completion of GrassRoots projects, provides teachers and students with increased access to new and modern technology. These awards also stimulate professional learning among teachers. In the vast majority of cases, the teachers involved in these projects have control over how to spend the money and many use it to support their own professional develop-

ment. Invariably these teachers also invest in new tools for their classroom and this in turn provides intrinsic motivation to learn how to use them and appropriately integrate them into their classroom teaching. In a school system that is for the most part under-funded, these financial awards provide classroom teachers with a degree of autonomy and independence in decision-making not available with other programmes. A science teacher in one of the city schools claimed that the resources he accessed through the GrassRoots Program were instrumental to him receiving national and international recognition for his work.

> I learned a long time ago that the school didn't have the kind of money I needed in order to grow my program. To me Grassroots was a real blessing; over the past 5 years my colleagues and I have been able to access over $40,000 to modernize our classrooms. Today I have an electronic classroom that includes a half dozen computer workstations, a digital camera, digital microscopes, a SMART board, an LCD projection unit and a laptop computer. My students and I use the technology in all of my classes and we've been able to do some interesting work – work that has resulted in me being recognized with national and international awards for teaching. Grassroots has been good to the school and to me personally.

6. Leadership Opportunities. To serve the purpose of innovation, an approach to leadership must be comprehensive; that means it must extend beyond the reaches of the people who occupy formal leadership positions. While it is acknowledged that people who occupy formal positions of authority do play a critical role in the operation of schools (see for example, Leithwood et al. 2000; Fullan 2001), in innovative schools there is evidence that leadership is 'distributed' (Leithwood et al. 2000; Ryan 1999) and that formal leaders empower their teachers to take action, to be creative, and to be innovative. Embracing a distributed approach towards leadership and empowering teachers to be innovative in their teaching (for example, participation in GrassRoots projects) is one of the reasons these schools achieve an innovative status.

The GrassRoots Program provides many opportunities for classroom teachers to develop and refine their leadership skills. When not working with their students these teachers are usually '... coaching or mentoring other teachers on some aspect of how to be an innovative teacher – whether it is integrating ICT into their teaching, completing a GrassRoots

application or learning how to use a project-based approach in teaching and learning', notes a principal of a small rural high school. This teacher-leadership leads to an increase in the capacity of the school to be innovative in its approach to teaching and learning. While the formal leaders (i. e. administrators) provide support for teachers so that they have the time and resources to do the necessary work that goes into the planning, development and implementation of GrassRoots and other innovative programmes, the real leaders in the integration of ICT are the knowledgeable, skilled and committed teachers who are willing to challenge traditional models of teaching.

7. School Growth and Development. The collaborative nature of the GrassRoots Program has influenced the increased level of collaboration between teachers, schools and other community agencies. Participants provided evidence of teacher collaboration on GrassRoots projects, both within schools as well as between sites. A principal from a large urban elementary school summed up the thinking of many participants when she said, 'connecting with schools in other provinces has provided learning opportunities for both teachers and students that would not otherwise exist.'

There is also evidence that the GrassRoots Program has enhanced the ability of these schools, from a knowledge and process perspective, to work with community partners on the development of ICT projects. Many of the schools developed community and industry partnerships in their attempt to find the necessary resources to develop their technology enabled learning environment. The experience of creating, maintaining and nurturing these relationships provided students and teachers with both new skills and a new understanding of the importance of a strong relationship between industry, the community and the school.

Conclusion

At this point in our history, innovation and the adoption of ICT in the nation's schools are essential if we are to meet the challenges posed by our rapidly changing society. Challenges such as globalization of the economy, pressing needs for skilled labour and technological advances are having an impact on our personal lives as well as our professional lives. Meeting these challenges requires educators to be innovative in their thinking about how to improve educational practices so they can better prepare their students for a successful transition to the global economy. There is no doubt that programmes like GrassRoots are providing the

necessary support and encouragement required for schools and teachers to be innovative in their use of technology for teaching and learning as they prepare students to take their place in the knowledge-based society.

From an innovation adoption perspective a solid foundation has been laid, and the GrassRoots Program has provided a strong connection between ICT and new teaching theories. As a result it is having a positive impact on the use and adoption of ICT by teachers and students in select Canadian schools and classrooms. And while some schools have transformed themselves into professional learning communities where educators are embracing innovative approaches towards teaching and learning, there is still much work to be done before these innovative approaches to education become systemic.

The paradox of innovation is that things continue to change and even successful programmes are in need of constant evaluation and updating – indeed that is the very reason that they are successful. The GrassRoots Program is no different. Industry Canada, the federal government department that provides the major institutional support for the GrassRoots Program, is currently considering changes to the programme design that would enable it to continue to work with schools that are on the leading edge of innovative practice as well as continue to create a culture of innovation in schools that find innovation a challenge.

So what should this new programme look like? Clearly, any new programme needs to move towards an innovative model that promotes and stimulates the development of schools and school districts as professional learning communities where people continue to push for systemic change. Three ideas that should be considered are: the development of 'innovative school districts', the development and use of 'learning object repositories', and the development and use of 'online learning tools and programmes.'

An innovative school district (ISD) would possess a vision of the future that involves the use of ICT as a resource in developing new and innovative ways to structure the education system and provide equitable access to educational services for all students and teachers in the district. An ISD would exemplify the characteristics of a professional learning community as outlined by DuFour and Eaker (1998) and Laferriere (2002).

Over the years, participants in GrassRoots have developed a wide variety of good quality, online K-12 content and curriculum resources. These resources must now be meta-tagged (Downes 2002) and organized as learning objects (Downes 2002) in a content repository that would pro-

vide a rich library of resources for teachers and students in every school in the country. Rather than continuing solely with the production of larger units of curriculum, the new focus could be on the development and production of small modules of content and learning resources with appropriately tagged learning objects. Learning objects are digital resources that can be used and reused to support learning. They are usually small chunks of information that are self-contained but can be aggregated with other learning objects to complete a learning unit or module. This knowledge building process is also characteristic of sophisticated professional learning communities.

Also, to promote online collaboration and participation in online knowledge building communities (DuFour and Eaker 1998; Laferriere 2002), the use of specific online learning tools and programmes should be promoted. Online learning tools and programmes are often based on constructivist learning theory which promotes the idea that learners learn best when they are involved in the creation of their own learning experiences. The uses of online learning tools and programmes are especially appropriate for helping students to learn academic, teamwork and personal development skills highlighted by the Conference Board of Canada in their Employability Skills Index.

The GrassRoots Program has met with tremendous success, primarily because it has been legitimated in an environment external to the school, is recognized as having a positive impact on pedagogy, is intrinsically motivating to teachers and students, and provides educators with extrinsic rewards for participation. Any new programme should build on these features.

The GrassRoots Program has been a powerful influence on innovation within the Canadian K-12 school system. There is every reason to believe that the *scale-up* process will continue and a sound educational practice will move beyond isolated pockets of excellence to transcend every school and every classroom in the country.

Notes

1. Readers interested in learning more about the GrassRoots Program are referred to Canada's SchoolNet GrassRoots website (http://www.schoolnet.ca/grassroots/).
2. Readers interested in learning more about the GrassRoots Program are referred to Canada's SchoolNet NIS website (http://www.schoolnet.ca/nis-rei/).
3. The Conference Board of Canada has identified (1) fundamental skills

such as the ability to communicate effectively, manage information, use numbers and think and solve problems; (2) personal management skills such as demonstrating positive attitudes and behaviours, taking responsibility, being adaptable, lifelong learning skills and workplace safety, and; (3) teamwork skills such as the ability to work well with others and to participate in tasks and projects. For more details please consult the Conference Board of Canada's Employability Skills Index 2000+ (http://www.conferenceboard.ca/education/).

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