

# Leadership, Organizational Learning, and the Successful Integration of Information and Communication Technology...

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## Leadership, Organizational Learning, and the Successful Integration of Information and Communication Technology in Teaching and Learning

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### **Abstract**

This study focused on a specific change related to the integration of information and communication technology (ICT) into teaching and learning in 15 case study schools in order to explore how leadership influences organizational learning, and to determine if those schools that engaged more frequently in organizational learning behaviours were more successful at implementing ICT in teaching and learning. The work provides empirical evidence that changing school practices, such as using ICT in teaching and learning, is very much dependent upon the level of organizational learning in a particular school. As well, it provides evidence that formal planning processes provide continuity of organizational learning only if there exists a critical mass of leadership that is collaborative and distributed.

## Introduction

This article describes case studies of 15 schools in one Canadian province that have been involved in a national project directed at the integration of information and communication technology (ICT) into teaching and learning. Because the intent of the national project was to bring about significant changes to the teaching and learning process, these project schools provide an excellent venue for the study of the factors that facilitate or inhibit change.

The intractable nature of school practices is well documented (Barth, 2001; Deal, 1990; Deal & Peterson, 1999; Sarason, 1990, 1998; Sergiovanni, 1995). Schlechty (2001) contends that “in spite of numerous waves of reform ... schools are not much different ... than they were fifty years ago” (p. xi). Barth (2001) asks the question: “If schools can’t be improved from within or from without, just how will they ever be transformed into places of profound learning for youngsters in the twenty-first century?” (p. xxiii). The response that many researchers provide to Barth’s question is that if necessary changes are to happen, schools must become learning organizations—places where organizational learning is maximized (Darling-Hammond, 1996; Fullan, 1998; Leithwood, Jantzi, & Steinbach, 1999; Sheppard & Brown, 2000).

For the purposes of this study, organizational learning is defined as:

the capacity (or processes) within an organization to maintain or improve performance based on experience. This activity involves knowledge acquisition (the development or creation of skills, insights, relationships), knowledge sharing (the dissemination to others of what has been acquired by some), and knowledge utilization (integration of the learning so that it is assimilated, broadly available, and can also be generated to new situations). (DiBella, Nevis, and Gould, 1996, p. 363)

This definition assumes that learning occurs naturally as the organization adapts over time. It also implies that such learning brings the organization closer to its goals. Consistent with this definition as well, DiBella et al. (1996) contend that organizational learning occurs “by building on existing capabilities or developing new ones. The latter involves a change in culture, the former involves improving current capabilities. Organizations can enhance their learning capability through either approach” (p. 361). The researchers in this study focused on organizational learning that occurred in the case study schools in the context of clear societal expectations that information and communication technology be integrated into the teaching and learning process.

Among the key variables related to organizational learning is leadership. In fact there exists considerable evidence that strong school leadership is essential to organizational learning in schools (Leithwood, Jantzi, & Steinbach, 1999; Sheppard & Brown, 1999, 2000). As well, there is a growing body of research suggesting that the leadership that will most likely maximize organizational learning in schools is leadership that moves away from technological, hierarchical, rational planning models, towards cultural, collaborative approaches in which teachers are viewed as partners (Darling-Hammond, Cobb, & Bullmaster, 1998; Fullan, 1999; Hargreaves & Evans, 1997; Leithwood, Jantzi, & Steinbach, 1999). For example, Mintzberg commented that society is “looking for leaders in the wrong places,” that people look for great

leaders who can “single-handedly keep enormous companies moving forward” (cited in Smith, 1999, p. 92). His point is that such leaders cannot do it alone. He contends that the role of chief executives has been overplayed. Education, influenced by leadership theories and expectations in the greater society, is no different.

While understandings related to organizational learning have grown and there are growing numbers of researchers who support the claim that organizational learning offers promising directions for research, school improvement, and the implementation of reform initiatives (Cousins, 1996; Darling-Hammond, 1996; Fullan, 1998; Leithwood & Aitken, 1995; Leithwood & Louis, 1999; Leithwood, Leonard, & Sharratt, 1997; Louis, 1994; Mitchell, Sackney, & Walker, 1996; Prestine & Dole, 1995; Sheppard & Brown, 1997), the relevance of organizational learning to education requires empirical study (Leithwood & Louis, 1999). As well, there continues to exist an urgent need to develop our understandings of connections between leadership and organizational learning in educational organizations (Leithwood & Louis, 1999). This study builds on the current research and attempts to contribute to our understanding of how organizational learning occurs in educational settings, how leadership is related to it, and how both are related to the successful implementation of a designated change initiative.

## **Methodology**

### **Site Selection**

This study was conducted over an eight-month period in 15 schools in one Canadian province that has been involved in a national project directed at the integration of ICT into teaching and learning. Because of the variety and complexity of factors believed to be related to organizational learning and the integration of ICT into teaching and learning, a case study approach was deemed to be the most appropriate approach.

A case study approach, implying a limited number of sites to be studied in detail, required that careful consideration be given to site selection. Purposeful sampling was employed to ensure the selection of information-rich sites that allowed the researcher to obtain detailed descriptions of each case to document uniqueness and to determine general patterns that are shared by heterogeneous cases.

### **Data Collection**

One researcher spent three days in each of the schools. Data were gathered through field notes of observations and through semi-structured interviews with each 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 information technology 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 were chosen at each school to represent grade levels consistent with school type (primary, elementary, intermediate, and high school). At least one of these student groups had experience in the use of information technology in their learning. The other two student groups were chosen at random from class lists. In addition to the data gathering at each school, the researchers interviewed four members of STEM~Net (an

agency sponsored by Industry Canada and the provincial government to design and develop a province-wide computer network for all K-12 educators in Newfoundland and Labrador). For the component of the research reported in this article, data from interviews with students and members of the STEM~Net staff were used primarily to establish the level of innovation of each of the case study schools.

The researchers conducted 92 interviews: 15 principals, 46 teachers, 27 groups of students, and 4 members of the STEM~Net staff, including the director, the senior training officer, the provincial coordinator for federally funded Internet-based resource units, and the Canadian coordinator of a national school Internet news program. All interviews were recorded and later transcribed.

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). To ensure inter-rater reliability of the coding, data from two schools were coded by two researchers. Following an intensive reflective session related to coding, one researcher coded all other data. Some codes were developed deductively on the basis of the current literature related to the organizational learning 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).

## **Findings**

Of the fifteen schools that were studied, the research team identified six of them as innovative, four as moderately innovative, and five as static. These classifications were made by a team of four researchers using one component of the national selection criteria set by SchoolNet<sup>[1]</sup> in their Network of Innovative Schools project. This one component, using six indicators, was designed to evaluate on a five-point scale the extent to which ICT was integrated across the curriculum and used to improve learning. The schools identified as innovative are labeled as follows: School 2, School 3, School 7, School 8, School 10, and School 15. These schools are recognized by their individual communities, their school districts, and STEM~Net personnel for their innovative use of ICT. Students at these schools accept ICT as a natural part of their learning environment.

The research team identified School 1, School 5, School 6, and School 12 as moderately successful in ICT innovation. In these schools, a “critical mass” of pioneer teachers is involved in the use of ICT to expand learning opportunities for their students. These pioneer teachers have integrated ICT across the curriculum with their own classes, but they are struggling with implementation issues in order to increase use throughout the school.

School 4, School 9, School 11, School 13, and School 14 were designated static schools in respect to the integration of ICT into teaching and learning. Although teachers in these schools have had several opportunities to learn ICT skills, ICT implementation is primarily restricted to computer courses that are mandated as part of the required provincial curriculum. One or two teachers who have a special interest in ICT may have initiated several special projects;

otherwise, expertise in ICT is limited. There appears to be limited vision of the potential of ICT in the teaching and learning environment, and therefore there is practically no awareness of the need for change.

### **Innovative Schools**

Leadership in the selected innovative schools is collaborative, supportive of innovation and risk taking, and inclusive of others, including teachers, parents, and other community partners. There is considerable dependence upon teacher pioneers, but regular teachers are becoming increasingly comfortable with the use of ICT. Morale is generally high throughout each of these schools, and team leadership is apparent. Organizational learning is evident as teachers, students, and parents of those schools are excited about the extent of learning in their school, are eager to share their experiences and new knowledge, and readily utilize any new knowledge acquired.

Leadership at School 2 appears to be shared among teachers, parents, and students. The principal articulated that he believes in shared leadership and described how he includes parents, students, and teachers as decision-makers in the school improvement process. He stated:

Shortly after I became principal, school development and school improvement were something that struck me right away in my principalship. Basically, it promoted shared leadership ... One thing that I did is ... included a delegation of students and parents, as well as teachers. So, when we made decisions it wasn't made by staff, it was made by a delegation of staff, students, and parents.

A teacher confirmed the school's involvement in school improvement and noted the positive impact of the process on teachers' willingness to participate as teacher leaders:

We've been going through a school improvement process for a number of years. We started this school improvement process about five or six years ago and we've gone through the growing pains of it. But we're at a point now that teachers feel free. If they see something that needs to be done, they just feel free to go and speak to the administration and bring up ideas that they have.

All teacher interviewees concurred that there is a great deal of teacher collaboration where sharing of new knowledge is commonplace. They indicated, as well, that the morale of the staff is high. For example, a teacher in her first year at School 2 commented:

Morale here is very high. The school itself is a wonderful school. I find, especially, as a new teacher, everyone tries to make you feel accepted and they know that you're a new teacher. If they have new ideas or instructional materials, they share them with you.

The collaborative culture at School 2 extends to the school-community relationship, as well. The educators recognize the place of their school in the community. Teachers provide courses in the use of ICT to parents and other community members. Also, the school is the centre for the local television cable station. As a result of its central place in the life of the community, the school appears to enjoy considerable community support. The principal expressed strong feelings about the place of the school in the community:

The school is basically a community centre. Taking a school like this out of the area would be total devastation! Our school is open seven days a week. Our students are here in school, doing something, seven days a week. And that's all with the help of some of the parents that are involved.

Similar to School 2, School 3 serves as the hub of seven communities in the local region. Although leadership does not appear to be quite as collaborative as in School 2, the teachers are quite enthusiastic about the level of teacher cooperation at the school. For example, one teacher commented, "I think the entire staff work together tremendously, and you can always find a lot of teachers to pull together and help you out no matter what you're doing." It is apparent that the principal is supportive of distributed leadership. He has allowed the technology resource teacher to exercise leadership in her field of expertise and he appears to be supportive of her efforts, as well as the efforts of a team of teachers that she has organized to lead technological change in the school. Students demonstrate leadership through the school's peer tutoring program, whereby many of the high school students act as tutors to students in junior high and elementary grades. As well, teachers have begun to accept student leadership in respect to learning as it relates to technology, as is revealed through the following student comment:

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

At School 7, there are few formal committees; however, the environment is a collaborative one. In fact, it appears that the culture of this school is a fully functioning learning community. As a result, formal, bureaucratic structures and procedures are not required as a means of ensuring collaboration. A teacher described the learning culture as follows:

There aren't many committees in this school. When decisions are made, it's usually done between either a teacher and the administration or a teacher and a department head or something along that nature. If I have initiative and creativity to start a project, as long as I can demonstrate that kids are going to be working on objectives and there were objectives in the course, then I have a lot of freedom to do pretty much what I'd like.

The principal stressed, "Almost every teacher in this school is a lead teacher in some aspect of school life." She felt that her role as a leader was to create a supportive atmosphere for teachers. She contended that she strives to treat teachers with respect and she trusts them as professionals. As a consequence, she argued:

The teachers have a sense of freedom in our school, knowing that such freedom comes inside certain boundaries of what's expected in a school. Here, they have a tremendous amount of freedom to take risks. And of course you have seen that reflected in our technology program.

Although school restructuring has resulted in major changes to the teacher and student population of this school, the collaborative learning culture has been maintained, and teacher

morale in this school has remained high. This learning culture has been extended to the community as well. One teacher commented that because the school has done a superb job of involving its community, restructuring that resulted in school consolidation in the region did not result in the major protests that occurred in many other regions.

In respect to ICT, the principal commented that she did not have the interest or the skills to provide direct leadership; therefore, she was quite pleased that she was able to provide an atmosphere in which others felt encouraged to lead. She admitted that she had not been always comfortable with sharing leadership, but she had come to realize that leadership is knowing when to defer to teachers' expertise and enthusiasm. She asserted:

With my background, technology in this school would be nowhere without someone with a vision and someone with energy to bring it where it is because I don't have that knowledge. It's not an interest of mine to know it. It's an interest of mine in terms of promoting it. So, unless you have a principal who's very technologically involved and has his or her own vision to lead the way, you really need a person on staff who can fill that role.

School 8, like School 7, has no formal committee structure to provide leadership; however, there exists a culture of collaboration that facilitates the routine formation of informal ad hoc committees that work on specific projects. According to one teacher:

Most collaboration is informal; by keeping it informal you're allowing everybody to get involved. Sometimes it is a particular thing that the school or the staff or the administration feels that we need more research on, then probably we would select a committee to do extra research on that and bring it back to the group. But decisions, as such, are made by a very informal discussion and it's not kept to meetings.

The collaboration at this school seems to be based on a culture of shared leadership. It appears that the ideas and visions are the prerogatives of all personnel and there exists an openness to organizational learning (the development of skills, insights, and relationships; the dissemination to others of what has been acquired by others in the entire school community; and the integration of the new knowledge into teaching practices). A teacher commented:

Sometimes the administration will come to the staff and suggest things we may want to try for change. The staff is very receptive to that. And even though we may have criticisms of some idea, we will try it. If it doesn't work, then we'll say that we don't think that worked well. "Maybe, we should go back or whatever." And the same way, if we see things that we want to change, or things that we think we can improve, if we go to the administration, they will try those for us as well.

The following comment by the school principal provides a clear image of the relaxed, collaborative, learning culture that exists at School 8:

We are a rather informal bunch, I think. It's not a matter of formality. The work you see coming out of this school is not the result of some committee who took a task and went away with it.

More often, our best work comes from a group of teachers out in the staff room who are relaxing at the end of the day, tossing around ideas. That, to be honest with you, is where our best work comes from as opposed to formal-committee-type operations. We don't operate that way. All I can tell you is that we have a staff that is not afraid of change, who embrace change, who have the attitude, "yeah, we'll try it. If it doesn't work, we'll go back to what we had."

It is this collaborative culture of learning that has allowed them to progress in the implementation of ICT. The school is a rural one that serves a sparsely populated region with a sluggish economy, and so funding for ICT infrastructures is not readily available. There exists little pressure from the school board for teachers to employ ICT in their teaching because they are not able to provide the necessary resources to support it. In spite of this, the school principal and several teachers sought to learn from the experiences of another urban, high-profile school that was known for its success. As a result, through a major business partnership and various federal government programs, they have been able to establish the ICT infrastructures that they envisioned. Within two years, the school has progressed from being a traditional rural school with little computer technology to being identified as an innovative school. Students and teachers now use ICT extensively for a number of courses.

At School 10, leadership is more formalized than at School 8. The school is located in an urban centre and draws students primarily from a suburban, upper-middle class neighbourhood. The principal noted that decision-making is a consultative process, but that she and her vice-principal have specific agendas that they promote. All teachers that were interviewed appreciated the principal's openness to new ideas and the extent to which she supported innovative teaching methodologies. It is apparent that the principal is quite supportive of ICT. Although she is not directly engaged in leading innovation in this regard, she is very supportive of the teacher-librarian who has taken a significant leadership role.

Teachers noted that most decisions are made collaboratively and that there is a good committee structure in place. Interview data suggest that many teachers are actively engaged in the integration of technology into school programs. Currently, four teachers serve on a technology committee that is responsible for decision-making in respect to technology at the school. Also, teachers are extensively involved in computer clubs that are offered to students four days a week. While there is evidence of an emerging culture of learning, both the teacher-librarian and the principal express concerns that in respect to ICT implementation, collaboration among teachers and grade levels is not at a preferred level. They recognized, however, that things are improving in that regard. The teacher-librarian commented:

Last year, I felt overwhelmed ... but since this past fall, things started to change. Some of the teachers came to realize that they were behind the times and they needed to make changes. They realized that they had responsibilities, or their students were going to miss out.

Similarly, the principal observed that "technology is becoming more and more a part of the program for more and more teachers. I think that's really positive."

School 15 appears to be a collaborative learning school, and teachers, parents, and students appear to play an active role in that collaboration. For example, junior high students tutor the



younger children during lunch break. Parents are active as volunteers throughout the school and are directly involved in their children's learning experiences. The teachers work collaboratively at their grade levels and are members of the school improvement committees. The teacher-librarian affirmed that he feels that he is well supported by the administration and that he feels empowered to provide leadership in his area. He explained his impressions of the school administration as follows:

The administrators are excellent in terms of ICT. It was their decision last year to hire somebody who had a strength in technology. They took me in the very first day and they said the lab is mine and to make my mark. That's what they told me. At the very first staff meeting, I made a proposal to change the school into a STELLAR[2] school and to buy a new server. I put in a budget for over \$12,000. I spoke with the administrators and they wanted staff to have ownership of it. So, we took it to the staff, I made a presentation at a staff meeting, and they all thought it was a great idea.

The teachers that were interviewed were quite happy working at this school. They perceived that morale was generally quite high, and they were quite positive about the decision-making process. All felt that their ideas were valued and that they were given the freedom to explore any creative ideas that they had. The school has operated for a number of years with a grade level committee structure that facilitates grade level collaboration. In fact, the teachers felt compelled to note the amount of time and energy that they devoted to committee work and collaboration. For example, one teacher stated:

It's a very, very good school to work in. The morale at the school is very good. The teachers have a very good morale and everybody loves to work hard and we're always "meeting" to death because we're always getting together to do something for the students or for the school, trying to make things a lot better.

Two years ago they began a formal process of school improvement. They chose to work on two focus areas: the integration of technology into the curriculum, and school spirit. Four subcommittees were formed to deal with the technology focus. The principal explained that teachers, rather than the administrators, made the final decisions regarding the school's direction and the formation of particular committees. Each teacher is a member of at least one of those committees. The level of professional engagement focused on improvement clearly reveals a high level of organizational learning.

Since the beginning of these technology committees, the school has progressed rapidly in ICT implementation. The teacher-librarian explained that he works with all classes and the classroom teachers on a regular basis, on projects and research units. In addition to regularly scheduled classes, students have access to the computer lab before classes in the morning, during recess, lunchtime, and after school. Although the teachers take ownership of much of the progress, they recognize the significance of the leadership provided by the teacher-librarian. One primary teacher commented: "Mr. B is our guide, our total guide. If we didn't have him, we would be lost. We do the teaching and research in books and things like that and then he is our total guide with the computer."

All of the above innovative schools were clearly engaged in organizational learning as each focused on ongoing improvement and continuously created and re-established structures that facilitated the acquisition, sharing, and utilization of new knowledge. As one assesses leadership in these schools, it becomes readily apparent that both the formal structures and leadership vary. Some schools have established elaborate school improvement structures and others have no formal identifiable improvement process at all. Similarly, there is no clear pattern of principal engagement. In some schools the principal is directly involved; in others, the principal gives support for the ICT initiatives without any direct engagement in the process. The common elements that facilitate organizational learning are as follows: leadership is perceived to be strong, collaborative, and shared across various constituent groups; morale is generally high; and there is a general sense of excitement that innovation is supported within the school and that it is safe to take risks. Except for two schools, Schools 8 and 10, the prominent place of the school in the community is viewed as an asset, and community support is perceived to be a significant facilitating factor. As well, the focus of the learning is on building the school's capacity in order to maximize the use of ICT in teaching and learning. Although leadership is shared, it is easy to identify one person who has championed the ICT focus. The formal role of that champion varied from school to school; however, the primary champion in each school was the school principal, the technology-resource teacher, or the teacher-librarian.

### **Moderately Innovative Schools**

In the moderately successful schools, a few pioneer teachers are involved in the use of ICT to expand learning opportunities for their students. These teachers have integrated some of their projects across the curriculum, but are highly dependent upon one or two individuals to provide leadership and support. Generally, they are struggling with implementation issues in order to increase use throughout the school. Leadership in these schools is somewhat similar to that which exists in the innovative schools, with several differences that may partially explain the difference in the degree of success that they have had in implementing ICT across the curriculum. Morale appears generally high, but there were several dissenting voices. Decision-making remains the prerogative of the administrators even though committees exist. These schools lack the more pervasive team leadership that is evident in the innovative schools. The teachers appear to be waiting for direction from their principals. As a result, organizational learning is somewhat stifled. In spite of this, teachers and administrators are generally content with the level of ICT leadership within the school. Some believe that their level of integration of ICT into teaching and learning compares favourably with neighbouring schools without having substantiated any of their perceptions. Others believe that they have not progressed as well as other schools, but blame their lack of progress on external sources such as the district or the provincial government. An inflated sense of success, a model of leadership that limits creativity, and a resulting pervasive sense of complacency inhibit organizational learning in these schools.

At School 1, leadership is distributed through various school improvement committees with each teacher belonging to at least one committee. These committees are focused on student achievement in various subject areas and on developing goals for their specific area of responsibility. Although the principal contended that he used the school improvement process as much as possible, one teacher suggested that this does not ensure collaborative decision-making. He stated that "sometimes the administration appears to be sort of 'closed-door' towards things.

The principal doesn't want to hear, or if he hears, he doesn't act on it.” Further, this teacher suggested that ideas were filtered through the principal before they were brought to the staff for a decision. This same teacher suggested, as well, that:

morale at times is low, but I think it's a factor of the teaching climate in general in terms of dealing with government and being turned down for salary increases and so on. We do have morale problems, but we seem to get by with them anyway.

Contrary to this one teacher’s opinion, however, a second teacher felt that morale was high. She stated, “This is a really comfortable place to teach. We have wonderful students. It's a good staff, a very settled staff.” These conflicting perspectives appear to be indicative of differences throughout the staff.

As for ICT implementation, School 1 is a recognized Community Access Point (CAP) for the Internet through a DirectPC satellite dish. The principal recognized that the technology teacher and the past principal had provided the leadership in ICT and that it was through their efforts that the school had become a CAP site. When asked by the interviewer, he was unable to articulate a personal or shared vision of future implementation. He complained that the implementation of ICT was dependent upon the technology teacher, rather than distributed throughout the teaching staff. In order to move beyond this stage of ICT implementation, he proposed an approach consistent with the traditional leadership model, whereby someone at the top of the hierarchy would exert pressure to require teachers to learn and use technology.

The level of student leadership in the implementation of ICT at this school is somewhat innovative. The traditional barriers that exist between teachers and students appear to have disappeared in this school. High school students routinely assist primary and elementary teachers in classes requiring the use of ICT and they act as facilitators and instructors in teacher training sessions related to ICT. The following comment suggests something of the relationship between teachers and students in this regard:

If students know and I don't, I figure reversal is fair play to ask them for help. It gives them a lift to be able to show the teacher something. If they're experts, then why should I be too uptight or too silly to ask them to show me how to get into this site, or to find such and such? The expertise is there, why shouldn't I use it? I can't be bothering the technology teacher all the time because he's got his own work and his own classes.

This school has progressed in the implementation of ICT. The direct involvement of the past principal, the leadership provided by the technology teacher, the high morale of some teachers, the leadership exhibited by students, and the willingness of teachers to engage in a new collegial relationship with the students provide a climate that is supportive of ICT implementation. However, it appears that this school lacks the more pervasive team learning culture that is evident in the innovative schools. The teachers appear to be waiting for direction from the principal, who obviously does not have the necessary expertise.

At School 5, leadership is somewhat distributed to committees; however, decision-making remains the prerogative of the principal and vice-principal. In the following comment, the school principal clearly reveals that final decision-making at the school level remains his prerogative:

I have a vice-principal and normally before we reach a decision we'll chat about it. In most cases, I have a number of committees created here whose task is to open discussions. Each committee works independently, and if there's a question of having to make a decision that affects the school, obviously, it's brought to me.

At School 6, a similar approach to decision-making exists, as can be determined by the following teacher's description of his involvement in decision-making in the school:

Well, I often talk to the principal about different projects that we're doing, or something that we're doing different, or something that I'm thinking about doing in my class. So, if I have a planning period or sometimes recess time, I go by the office and if he's there, then we'll chat about it. We have grade level meetings about once a month and other than that, there are different committees in the school.

A response from another teacher at School 6 suggests that there exists a committee of teachers focused on the promotion of science and technology; however, it remains clear that the principal makes major decisions:

We have a Science and Technology Committee that's really focused on students and what we can do for students to promote Science and Technology in the school. The committee is more student-centred, but there are also decisions that need to be made. However, anything regarding budget decisions in the school would go to administration. If there's something that I need or require, then I go to administration.

Teachers in both School 5 and School 6 appear to accept this approach to decision-making. All teachers were quite consistent in saying that although they engage in discussions as members of various school committees, the principal makes the final decisions. However, no one raised a concern regarding the decision-making process. Teachers appear to enjoy working at these schools and several noted that students, parents, and the staff feel positive about the educational opportunities provided. Organizational learning is somewhat modified, as the creation, sharing, and utilization of new knowledge occurs at a pace that is controlled by a central leader, the principal.

At School 12, there exists a committee of lead teachers for various subject areas, but final decisions remain the responsibility of an administrative team of three people, the principal, vice-principal, and guidance counsellor. The principal described the administrative structure as follows:

We have what we call here the lead teachers, probably leading into department head status. We do our usual staff meetings, of course. We have lots of committees. We have a technology committee and a science committee. We have lots of staff involvement in terms of decision-making. I would never ever want to make decisions party to one or two

people. The administrative team, the principal, vice principal, and guidance counselor, meet regularly, and jointly make decisions on just about everything that happens.

One teacher's response to a question concerning how decisions are made in the school suggests that although teachers have input, the principal has maintained his "position power" in respect to decision-making: "There is a group of teachers who get together and discuss these sorts of things and as far as approaching the principal goes, he is very receptive to any suggestions that we make."

Teachers appear to be quite happy working in this school. They appear to be content with their level of involvement in decision-making and with their level of ICT use. Similarly, the principal appears to be quite comfortable with the school culture and with the current state of ICT implementation in his school. He notes that:

this school has always been in the forefront as far as technology is concerned. Having people like Mr. F around, and of course our computer technology teacher, in a town like this and a school board like we have, and so on, we've always been out there in the forefront.

The change literature suggests that people endorse change when they feel a need or critical tension to do so. The teachers and the principals at these schools appear to be comfortable with their circumstances and they believe that their schools are progressive in the use of ICT; therefore, it is unlikely that they will have any sense of urgency about change. Although all schools have progressed in the use of ICT, the limits of the schools' potential to learn may be restricted by an inflated sense of success, the acceptance of a traditional hierarchy, bureaucratic models of decision-making, and a resulting pervasive sense of complacency. Membership on various committees and teams within these schools is generally restricted to educators from within the school. As well, risk taking is minimized, as the formal administrators control most decisions.

### **Static Schools**

In the static schools, leadership tends to be traditional and hierarchical. Although teacher committees exist for the purpose of school improvement, the most common expectation of teachers is that the principal is responsible for bringing about change. Organizational learning in these schools is inhibited by restrictive models of school administration, limited expertise, and no apparent stimulant that will initiate learning related to ICT. The existence of a formalized school improvement process with supporting committee structures has not guaranteed success even when the process has been focused on the implementation of ICT in the classroom. In each school, one or two teachers with a special interest in ICT have initiated several projects integrating ICT into curriculum units with their own classes, but they have not been able to provide the kind of stimulus required to share their new knowledge with others. There appears to be limited vision of the potential of ICT in the teaching and learning environment, and therefore there is practically no awareness of the need for change. Teachers and principals in these schools tend to blame any perceived backwardness in ICT on lack of infrastructure, support, or leadership from the school district and government, a classic inhibitor of organizational learning.

The principal in School 9 noted that teachers had little time for working on committees because they were already committed to involvement in co-curricular activities. In the meantime, he recognized the need to have someone pushing for change. He blamed the lack of impact of ICT on the chaos that had resulted from school restructuring, and he suggested that the lack of provincial and district vision had severely limited progress in technology in education:

Really, our curriculum has not changed significantly. Our ability to implement some of the technological advantages into the everyday curriculum has not changed. I think that's the most staggering part of our education system right now ... Unless you have somebody who's pushing to make the changes, for the most part, they will not happen. There's not enough time in the day to also have an ongoing committee structure. In my opinion, we've lost this drive for the integration of computers into our school. With all of this chaos due to restructuring and with the lack of a common vision, I think we're back at the beginning. We have not seen any leadership—the dinosaurs of education are at the top.

Although there are some morale problems at this school and an apparent tendency to “blame the enemy out there,” some teachers are quite happy to be members of the teaching staff. They feel that they are making progress in the use of ICT at the school and that they have opportunity for input into decisions. For example, one teacher commented:

They have committees for a lot of different aspects. They have the School Growth Committee and School Improvement Committee and various committees, but when I come up with an idea that I like, then I present it to the principal and he's very supportive. So far, everything that I've wanted to do I've been able to do. So, he's very supportive in that way.

In respect to this latter comment, it is interesting to note that in reference to committees in the school, the teacher employed the third person pronoun “they,” giving the impression that she does not feel ownership of these committees. Further, when she has an idea, she shares it with the principal, rather than the committee. The process that she described is entirely dependent on the good will of the principal and appears to be hierarchical, rather than collaborative.

At School 13, there exists an elaborate committee structure. There is a school improvement steering committee whose membership is made up of teachers and school administrators. In addition to this steering committee there are various subcommittees of teachers, students, and parents that provide leadership. However, in spite of the committee structure, the principal and vice-principal are the primary decision-makers in the school. The principal explained that there are three levels of decision-making in the school. The first level includes teachers as members of a school improvement committee. This committee meets at the beginning of each year to determine the annual goals. On the basis of these goals, new committees made up of teachers, parents, and students are formed. The second level of decision-making rests with department heads that make decisions for their academic unit. Finally, the administrative team of principal and vice-principal meet on a weekly basis to review what is happening. They talk about their priorities for the school and collaborate in making the decisions.

The school administrators make the final decisions. A teacher who is a member of various school committees described the decision-making process as follows:

As far as decisions being made, there are some that we do have a great deal of representation in decisions that are being made and others that we don't. Sometimes we have made decisions that have gotten changed.

It is evident that a controlling hierarchy limits decision-making and organizational learning.

Leadership at School 14 is management focused. The principal is in his first year in that role at the school. The school is a large urban school that has enjoyed a strong reputation as an academically superior school. Each year, students of School 14 receive disproportionately more provincial scholarships than other schools in the region. The previous two principals have been traditional administrators, focusing mainly on management concerns. Several attempts to engage teachers in a collaborative school improvement process have failed. Although the current principal has initiated a school improvement process in the school, as mandated in the Provincial Schools' Act, it appears that he has accepted the culture of the school, which is focused on maintaining traditional practices. There was no expectation that anyone other than students should be learners. Because of the level of success in academics and general community acceptance, the teachers at School 14 have a high level of felt efficacy and their morale is generally high. A new teacher observed that:

There is a really good feeling here. The school morale is fairly good. Teachers work together fairly well. I think there is pride in the school on the part of teachers and students, and teachers have input into decision-making in this school.

Unfortunately, there exists little awareness of a need for change. Even though our interviews and observations revealed a distressing lack of innovation in respect to ICT, the lack of awareness of the school's backwardness by even the technology teacher was mind-boggling. As a result, the school has not focused on the implementation of ICT into school programs beyond the minimum expected in provincial curriculum documents. In such an environment, collaboration appears to result in "groupthink" (Janis, 1982). The new principal's approach to leadership appears to be laissez-faire. For example, when asked what his plans were for the next two years his response was:

Well, I think if I were going to set a two year plan, the first thing that I would do is to meet with my staff council and we would solicit suggestions from different people on our staff and then go to the outside and see what—you know, get help from the school board and then set our directions. It is very difficult for me to say because, number one, that is not how we do things here, and number two, you know I certainly wouldn't have the answers.

He expressed a degree of contentment with the current level of ICT in the school and appeared not to be aware of the school's backwardness in ICT use when compared to other schools. He was quite excited about the fact that he had recently begun to use a school administration software program. He appeared to be unaware that many schools in the province have been using

this software for several years. In that regard, his primary goal for the wiring of all classrooms for ICT is to provide teacher access to the records maintained through this software. He stated:

Just last summer, we had every classroom wired for accessibility, so now we can hook into basically every classroom with a computer system. Eventually, what we want to do is to have a computer in every classroom so that teachers can access our administrative programs and allow them to keep tabs on student progress.

As is the case in School 14, the principal of School 4 is in his first year as principal. While he espouses a belief in team leadership, he does not practice it. The following comment suggests that he has confused collaboration with consultation:

I have found since September that the staff trusts me more and I think the relationship is warming up more and more towards me as opposed to earlier administrators. I think there was more of a distance between them. I want to act in an atmosphere, or to create a climate, where they're comfortable with me as one of their peers. All decisions, I try to make, I usually try to run them by the staff. I believe in the collaborative model, but now like everything, there are times when you need to make a decision on the spot. But I do believe in getting staff's opinions first. That doesn't mean I always listen to the staff, but at least, I feel out what's going on and try to make decisions through a consensus approach.

Comments from teachers, though positive, clearly reveal that the principal is the primary decision-maker.

The principal of School 11 operates within a similar framework. He described an elaborate committee framework; however, these committees serve to advise him on their priorities and he attempts to meet their needs:

We organized a committee that I call a professional development team of teachers where I took the assistant principal, guidance counselor, the special education teacher, and all the department head representatives. They're running the administration of the school, including school improvement and budgeting, so that everyone knows exactly what has been spent here. They give me what they need. If it's a need related to technology, or whatever, I try to meet those particular needs.

The following comments from a teacher in this school reveal a common theme in all static schools that teachers accept the traditional hierarchical model of leadership and are willing to defer to the decision-making authority of the principal:

You get your point across, sometimes, through conversations next to the coffeepot, certainly in staff meetings and things like that. I find that the relationship with the principal and the vice-principal is more of a professional one than I have been used to. I like it because it's given me the feeling that my opinions count. Sometimes, some of your ideas will be accepted and other times they won't.



It is apparent that changes in personnel and provincial restructuring have impacted negatively on the implementation of ICT into the classrooms of School 11. The principal kept referring to a technology teacher that led ICT programs several years ago. As a result of this teacher's initiative, the school progressed; however, when he left, there was a vacuum in leadership. Also, while it appears that the principal has taken considerable direct interest in ICT, it is apparent that there has been little pervasive impact on teaching and learning in the school. This school appears to be a good example of the dangers inherent in overdependence on the leadership of one or two teachers in a school. This school appears to have been an innovative school that began to quickly decline as a result of staff changes. In spite of the decline, teachers are quite positive about teaching there. They perceive themselves as being "a very collaborative group." Although such a positive outlook should be cause for celebration, in this case it is a source of some concern because it raises the question of why teachers are so positive and so willing to defer to the decisions of the principal, or others, when a decline in their resources and programs is evident to outsiders (the research team) and to the school principal himself. Clearly, organizational learning is not evident in School 11.

In all of these static schools there exist committees that are structured to bring about school change; however, these committees are not decision-making groups. In all cases, the principal is recognized as the final decision-maker in the school. There was no reference to anyone that championed the integration of ICT in the classroom with the exception of the ICT teacher in School 11 that had initiated innovation in ICT use. When this person left the school, innovation stalled. These static schools demonstrate that creating collaborative cultures in a school does not ensure organizational learning or successful implementation of a change initiative such as the integration of ICT in teaching and learning even when the principal supports it.

### **Discussion and Conclusions**

This article began by noting that trying to change teaching and learning practices in schools has proven to be a monumental challenge. It was argued that there is growing evidence suggesting that schools that develop their organizational learning capacity experience more success in the efforts to change. Using organizational learning as defined by DiBella et al. (1996), the researchers set out to determine how leadership influences that learning, and to determine if those schools that engaged more frequently in organizational learning behaviours were more successful at implementing ICT in teaching and learning.

One finding related to mandated school restructuring. Although the government-mandated restructuring of the school system led to structural changes that principals perceived to be the most significant change that had occurred over the last few years, there was no evidence that these mandated changes facilitated the implementation of ICT in teaching and learning. In fact, evidence from several of our case study schools suggests that restructuring inhibited learning in respect to the implementation of ICT across the curriculum, as more attention was given to matters related to restructuring than to changes in teaching and learning. As well, ICT leaders at the school level, who were most often among the most junior on the staff, were often "bumped" from their schools as a result of school closures intended to eliminate duplication of educational services through restructuring. Given the pervasiveness of school restructuring throughout the nation, it is notable that, despite school personnel's widespread recognition that it represents the

most significant change in recent times, it was not perceived to have any positive impact on the implementation of ICT in teaching and learning that most interviewees recognized as a necessary change.

A second finding of this study related to the recognition by teachers of external pressures to acquire new knowledge and to change. The recognition of the need for the acquisition of new knowledge in respect to the integration of ICT into teaching and learning appears to have grown from general recognition of advancements in ICT and a perceived expectation from society that schools would have to change if schooling was to remain relevant. Unfortunately, however, these external pressures did not create sufficient tension to facilitate change in all schools. In fact, while teachers in the static schools recognized advancements in technology, they employed defensive routines that insulated them from the creation of tensions that would initiate the need for learning. Shared knowledge structures stored in the long-term memories of the static schools (Senge's [1990] mental models) were huge impediments to learning. These knowledge structures created a "groupthink" image of the school that allowed teachers to believe that change was not required. They accepted traditional models of leadership as well as traditional classroom practices. Additionally, senior teachers found it difficult to accept that junior teachers could be a source of new professional knowledge. A comparison of the three success levels (innovative, moderately innovative, and static) allowed us to conclude that principals who fostered school cultures of shared leadership that were facilitative of learning throughout the whole school community were most successful in the implementation of ICT in teaching and learning.

A third insight from this study is that formal school improvement processes, even when focused on the integration of ICT in the classroom, did not foster leadership to facilitate learning. Similarly, findings from this study suggest that the existence of committees and school improvement teams do not guarantee that a continuity of focus will be maintained over time. This finding appears to contradict conclusions reached in another recent case study focused on change (Sheppard & Brown, 2000). In that study, my colleague and I concluded that the most important mechanisms for sustaining continuity of change in the two schools that we studied appeared to have been the formal goal setting and the school improvement planning processes adopted by each school. This current study contributes to our understanding of that phenomenon. Where school teams are empowered to provide the necessary leadership, they function as champions of the process. However, if the teams are simply contrived school structures that are subject to the decision-making powers of the principal, they serve neither as effective catalysts of change nor as effective agents to ensure continuity of focus. The difference between the static schools and the other, more innovative schools was that in the innovative schools there was someone to champion the cause. In both the innovative and moderately innovative schools, there existed at least one person who had a vision for the integration of ICT across the curriculum and who promoted that vision from within the school. Furthermore, differences between leadership in moderately innovative schools and innovative schools clearly reveal the facilitating impact of a leadership approach that is distributed among multiple sources, is collaborative, solicits community support, and champions the engagement of others as a community of learners as they strive towards the attainment of an articulated vision.

A fourth lesson of this case study is that large-scale university or government initiatives such as STEM-Net and GrassRoots can have a major impact on the use of ICT in teaching and learning

environments in schools. The ICT leaders in schools acquired much of their knowledge from the multiple formal and informal training and educational experiences provided through these external initiatives. The infrastructure and financial supports facilitated knowledge sharing and knowledge utilization within the schools. However, it cannot be assumed that just making such programs available will result in learning in all schools. In the case study schools, the success of such initiatives was largely dependent upon strong leadership and whether a culture of organizational learning existed at the local school. Although STEM~Net and GrassRoots programs were major direct sources of knowledge for ICT leaders, the primary sources of knowledge at the school level were the internal ICT leaders themselves, who shared their newly acquired knowledge and assisted others in early utilization in the classroom. In schools where opportunities were limited for internal experts to share their knowledge, implementation was restricted to their classrooms only, and when these people departed the school, implementation stalled.

This study provides empirical evidence to show that school principals are critical to changing classroom practices, such as using ICT in teaching and learning. Such a finding is certainly not a new revelation; what is useful here is that the evidence suggests the principal's influence is greater when it is indirect. When one compares the principal's leadership in schools that have been more successful with implementation of ICT, it becomes readily apparent that they were focused on sharing leadership that fostered cultures conducive to organizational learning. In the innovative schools, the principals were not necessarily the champions of the specific change initiative; others might have assumed that role. The principals, however, were champions of organizational learning. They found ways for teachers to learn on the job and encouraged all to be instructional leaders. As a result of distributed leadership and a learning culture in those innovative schools, multiple leaders emerged to become champions for the change initiative. These champions felt empowered. They did not feel compelled to seek permission of the formal leader to act, nor were they threatened by the risk of failure. In fact, there is a general feeling in those schools that failure is part of the learning process. Even when societal pressure for change was obvious, and committees and teams were established to lead that change, the change did not occur in static schools and was somewhat restricted in the moderately innovative schools because leadership and learning were primarily the responsibility and prerogative of formal leaders. These findings suggest that where no one has assumed leadership that fosters organizational learning, or where the formal leaders hoard power, an external stimulant may be necessary to encourage school staffs to challenge the mental models that help perpetuate a sense of complacency that exists in the long-term memory of individual schools. Finally, this study reveals the essential link between leadership, organizational learning, and successful implementation of ICT in schools.

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Schools that are designated as STELLAR school are supplied free 4 Mbps cable connectivity to schools through a partnership agreement with STEM~net and a local cable company.

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### Author Notes

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