THE REMOTE NETWORKED SCHOOLS (RNS) INITIATIVE
SUMMARY (PHASE 2 Report)

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CEFRIO

CEFRIO is a liaison and transfer centre comprising nearly 160 university, industrial and governmental members and 51 associate and guest researchers. Its mission is to help organizations to be more productive and contribute to public well-being through recourse to the information technologies as a means of promoting change and innovation. CEFRIO conducts, in partnership, throughout Québec research, pilot and strategic monitoring projects devoted to the adoption of the information technologies. These projects cover all sectors of Québec’s private and public economy. The major part of funding for CEFRIO initiatives comes from its members, and from the Québec government, its main financial partner.

The Remote Networked Schools initiative is a joint venture of the ministère de l’Éducation, du Loisir et du Sport (MELS) and CEFRIO, in partnership with the ministère des Affaires municipales et des Régions and the ministère des Services gouvernementaux. The research team comprises: Thérèse Laferrière, Ed.D., Full professor, CRIRES, Université Laval, Alain Breuleux, Ph.D., Associate professor, CRIRES, McGill University, Stéphane Allaire, Ph.D., Professor, Université du Québec à Chicoutimi, Christine Hamel, Professional researcher, Université Laval, Sandrine Turcotte, Doctoral student, McGill University, Paul Inchauspé, Consultant, CEFRIO, Josée Beaudoin, Project director, CEFRIO.

The 13 participating School boards:

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Web Sites:  
http://www.cefrio.qc.ca/projets/proj_34.cfm
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The future of small communities in Québec is an important factor in ensuring regional vitality and maintaining quality public services. Small schools, in this context, are playing key roles in encouraging families to remain in such communities, through the delivery of local educational services of a quality equivalent to those found in bigger schools. The Remote Networked Schools initiative was launched in 2002 and reflects the Québec government’s desire to explore innovative models that make it possible to ensure the survival of small schools throughout Québec by means of innovative use of connectivity and the Internet.

The initiative has expanded over the past two years to include over 50 elementary and secondary schools located in most regions of Québec. In association with a team of researchers from Université Laval, McGill University and the Université du Québec à Chicoutimi and through the sustained support of 13 school boards, the Remote Networked Schools initiative has made it possible to explore new uses of telecollaboration in networked learning situations. CEFROI’s report is conclusive: the Remote Network School model is contributing to the enrichment of the learning environment in classrooms in the participating schools. This summary takes stock of the overall results of this phase in the research project.

“To learn in a networked school means more than using a computer to download and access information, do certain prescribed exercises or listen to a teacher in a remote location. It implies connecting with other individuals and engaging in productive interaction not only in order to socialize but also to learn.”

(Final report on phase 2 of the Remote Networked Schools initiative)
While obstacles persist and new organizational and pedagogical configurations are appearing tentatively, the networking of students and teachers clearly fosters learning and professional development. There are indications that suggest that it promotes the revitalization of the school in its immediate environment. CEFRO and MELS also hope to pursue the initiative in the coming years to ensure its consolidation and continuation.

The combination of fibre optics used throughout the territory, the appropriate technological tools to support learning by students in the training program, and a network culture in the educational sector are all essential to the future of small schools in Québec. For four years, the Remote Networked Schools initiative has confirmed the success of such a combination, for the benefit of schools and students alike.

We would like to sincerely thank all of the interveners in the field who are making the Remote Networked Schools initiative a success, i.e. school board managers, school principals, teachers, educational consultants, Récit advisers, computer technicians, and the school councils and municipal representatives who are supporting the initiative. Such a collective effort in various contexts and local cultures reflects the ability to lead and to innovate of the educational and municipal sectors.

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TABLE OF CONTENTS

FOREWORD.................................................................................................................................... 3
CHAPTER 1 THE CONTEXT ......................................................................................................... 7
CHAPTER 2 LESSONS LEARNED FROM PHASE 2 OF THE RESEARCH PROJECT ........ 11
CHAPTER 3 CONSOLIDATION OF THE NETWORKED SCHOOL................................. 19
CONCLUSION .............................................................................................................................. 25
APPENDIX 1 ................................................................................................................................. 27
CHAPTER 1
THE CONTEXT

The Remote Networked Schools initiative is being carried out jointly by CEFRIO and the ministère de l’Éducation, du Loisir et du Sport (MELS), in collaboration with the ministère des Affaires municipales et des Régions, the ministère des Services gouvernementaux, the Fédération des commissions scolaires du Québec, and the Centrale des syndicats du Québec.

The initiative stems from three key concerns that prevailed in 2001: the search for new solutions to solve the problem of the closing of small schools in Québec, the use of fibre optics in the regions of Québec, and the growing interdependence between the fate of schools and that of the surrounding communities. This context made it possible to contemplate the future of small schools from a new perspective that brings into play the information and communication technologies and connectivity as a means of revitalizing the schools. What if these technologies could ensure the survival of small schools and, consequently, contribute to the vitality of the local communities in which they are located? This is the underlying hypothesis that gave rise to the Remote Networked Schools initiative.

Networking as a factor in the revitalization of the small school

At the outset, the model advocated by the initiators of the Remote Network Schools (RNS) initiative and, in particular, by the researchers associated with the initiative, centred on the networking of schools, i.e. the collaboration of classes and schools in order to enrich the learning environment. Networking is distinct from distance learning in that it does not seek, first and foremost, to deliver educational services between a teacher and students who are geographically dispersed. Instead, it assumes collaboration between teachers and students located in different schools: planning by teachers of learning situations, collaboration in the realization of these learning situations through the use of the network’s tools, new classroom processes stemming from these tools, the opening up of the classroom’s natural boundaries, and so on. The outcome has been an entirely new way of fostering learning and a new culture of collaboration between the teachers in the schools concerned.

Over the past four years, the RNS initiative has made it possible to experiment with the networking of schools in a variety of learning situations. Indeed, it was necessary to invent networking practice both for teachers and students and for the interveners outside the classroom involved, such as educational consultants, Récit advisers, and so on. The experience marked a major change for everyone involved, starting with the teachers, and mobilized considerable effort on the part of those concerned. The implementation of networking as a viable solution to the problems of small schools signifies, first of all, a change in pedagogical practices. Technological tools serve as the basic material to support the teachers’ pedagogical intentions.

1 These individuals are responsible for overseeing the integration of the information and communication technologies (ICTs).
The results of the Remote Networked Schools initiative observed to date confirm the relevance of the networking model as a factor in the enrichment of the learning environment in the small school.

**A perspective that integrates the school environment**

From the outset, CEFRIO and MELS emphasized an approach that fosters the anchoring of the school in the surrounding community and, consequently, a strong concern for the ties established between the school and community stakeholders. The advent of fibre optics in rural communities in Québec made such an approach realistic and suggested new models for collaboration between the school and the surrounding community. The RNS initiative is still the foremost showcase for the use of fibre optics in rural areas in Québec and thus puts the education sector on the leading edge from the standpoint of innovative practices.

**An innovative action research approach**

CEFRIIO and researchers involved in the Remote Networked Schools initiative have developed an innovative approach to carry out and study the adoption and implementation of the model. Specifically, the action research project focuses on:2

- an experimental approach involving elementary and secondary schools (from 10 schools in phase I, the RNS initiative encompassed over 50 schools in phase 2). This approach assumed a commitment by the interveners to devote themselves extensively to the innovation, according to rules set out in a collaborative research protocol;
- the measurement of the students’ results (written comprehension tests, motivation tests and vocabulary analyses) and of the perceptions of teachers and interveners outside the classroom by means of questionnaires and interviews;
- compulsory use of two technological tools in participating schools: iVisit Internet-based videoconferencing software (synchronous and oral) and Knowledge Forum software, used to co-construct and build knowledge collaboratively between students (asynchronous and written);
- a networked observation process that relies on these tools to assemble research data throughout the project (in this instance, the research-intervention team developed new methods to document the use of the network);
- the expertise of a networked research-intervention team to support the school teams and all interveners in the school boards (educational consultants, Récit advisers, technicians, and so on);
- an iterative process in respect of dialogue with interveners in the field in order to provide, as the RNS model unfolded, specific data, and profiles of network use for learning purposes. The data were also provided to facilitate decision-making among the interveners concerned in the school boards, schools, and classrooms. They focus simultaneously on quantitative and qualitative elements;

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2 The research report presents the innovative structure adopted, the conceptual models that researchers used, conditions conducive to innovation, research procedures, virtual ethnography research, and so on.
multi-tiered governance, whose levels were carefully managed to ensure the initiative’s advancement, comprising a steering committee (three deputy ministers of education, representatives of the government departments involved in regional development, representatives of interveners in the education sector, and CEFRI0), follow-up committees chaired by a decision-maker from the school board and assembling participants in the innovation, school teams, and liaison committees in the local community;

predictions concerning the organizational and technological facets of the networking of small schools and school-community partnerships, by means of analyses, reflection, case studies and discussions with managers in the school system;

a transfer approach that fosters the pooling of practices, the accountability of the interveners participating in the innovation, and reflection with project researchers. This approach took shape through meetings between peers and meetings that assembled all categories of interveners.

From phase 1 to phase 2 of the initiative

During the first phase of the initiative (2002-2004), three school boards agreed to host pilot projects. Ten elementary and secondary schools acted as pioneers in the Remote Networked Schools initiative. During the subsequent phase, 13 school boards and over 50 elementary and secondary schools participated in the innovation.

It would be relevant to briefly note the conclusions of phase 1 of the research project from the standpoint of the perceived benefits of networking and new classroom processes, depending on the interveners concerned:

students: socialization, motivation, enhanced oral abilities, greater awareness of responsibilities stemming from the new roles they play in the classroom, including more active roles that foster the coconstruction of knowledge;

teachers: reduced professional isolation, a favourable perception of students’ abilities, savings of time, a classroom process that encourages students to play an active role, a significant contribution by the innovation to professional development;

the school: greater interest among parents in the school, new roles and leadership among school principals, greater awareness among community residents of new uses for fibre optics, greater openness of the school in relation to the community;

the school board: a new understanding of the use of ICTs in the classroom (students’ success), a renewed perspective of the delivery of educational services in small communities, and the adoption of uses of the network for educational purposes.

During phase 2 (2004-2006), which involved a bigger sampling of schools and, in particular, a larger number of secondary schools, the results were confirmed. Participants noted an enriching of the learning environment in these schools, inasmuch as certain conditions conducive to innovation were clearly present. Observations and the collection of quantitative and qualitative data made it possible during this phase to broaden certain facets of the RNS initiative, among other things from a pedagogical standpoint. The broader scope of the research project highlighted factors for advancement, specific constraints, and the challenges facing different groups of interveners. It also made it possible to more closely examine the students’ academic performance, document new classroom processes and the types of coconstruction approaches adopted in learning situations in the participating schools. Special attention was paid to certain organizational questions, including the renewal of secondary school organization.
CHAPTER 2
LESSONS LEARNED FROM PHASE 2 OF THE RESEARCH PROJECT

As the Remote Networked Schools initiative advanced, results were noted at several levels. They are presented here in light of the activity theory and, in particular, Engeström's model (1987):³

School board managers who wish to establish RNS practices to enhance the learning environment offered by small schools to ensure the academic success of students use the tools that the RNS initiative makes available to them. The managers express a political will and first focus on the eight conditions conducive to innovation (Ely, 1999⁴) that the initiative is proposing: dissatisfaction with the status quo, knowledge and skills (technical and pedagogical), adequate resources, time, participation, commitment, leadership, rewards or incentives. Appendix 1 briefly explains these eight conditions.

The results obtained concerning the implementation of conditions conducive to innovation show that these conditions grow over time. The following conditions are perceived as being increasingly and persistently present: leadership, participation, and rewards and incentives. We noted an improvement in certain conditions conducive to innovation, which varied from one school to the next, i.e. adequate resources, including electronic connectivity, time, and commitment by managers. Récit advisers recognized the availability of time as being more important than teachers did. Two conditions were less apparent and somewhat unstable on most sites, i.e. knowledge and skills (technical and pedagogical), and dissatisfaction with the status quo. As for the latter factor, teachers expressed


more dissatisfaction than other interveners with the situation that prevailed at the outset.

The role of school board interveners is altered by the use of RNS tools, primarily by synchronous service delivery through videoconferencing.

The role played by the principals of RNS schools participating is broadened outside the school through more frequent contacts with the local community for the purpose of partnerships and through the coordination of timetables with partner schools. Inside the school, the need arises for principals to initiate new teachers to the nature of a RNS school and facilitate the realization of networked learning activities and projects, indeed, to exercise pedagogical leadership.

Teachers, who exercise more immediate decision-making power from the standpoint of the learning environment of their students generate through their participation in the RNS initiative results of a secondary nature since it is the classroom activity system that changes:

Their classrooms thus become networked learning communities when they interact by means of iVisit or Knowledge Forum with at least one classroom in another school of similar size or bigger. The role played by the teachers of these classes changes when they undertake co-teaching:

- co-planning of hybrid learning activities and projects, i.e. directly with their own students and through the network with fellow teachers, an educational consultant or a Récit adviser;
- the realization of learning activities and projects on the network by means of iVisit or Knowledge Forum.
Activity on iVisit

No fewer than 19 separate activities realized by means of this videoconferencing system were identified (see the two figures below).

School board interveners have at their disposal virtual rooms on the iVisit server that they can create themselves. They can use one of these rooms to hold planning meetings, consult the research-intervention team, one of whose members is permanently available in the support room, or participate in a meeting.

It is in one of these rooms, regularly assigned to a school class, that teachers integrate one or more students into their class or conduct exchanges pertaining to learning activities or projects between their students and students in other classes.
As for students’ learning activities (see the “Students’ learning” section in the figure above), “Teamwork by distributed students” was the predominant activity pursued, followed a distant second by “Supervision by an adult other than the teacher” and “Mini-profs.” Activities involving adult interveners predominate but activities involving students account for one-third of the situations observed. Classroom organization and timetables in elementary schools allow for more extensive use of iVisit, which is hard to use in secondary schools. From an organizational standpoint, the timetables of twinned teachers rarely match at the outset or bandwidth is lacking because of extensive Internet use in computer laboratories. Special attention must be paid to the number of students using the Internet during the allotted time slot and the necessary adjustments must be made. Some 97% of the teachers who answered the questionnaire said they valued iVisit exchanges. Secondary school teachers engage in more extensive exchanges through iVisit than elementary school teachers. Electronic connectivity needs are clearly growing and reliance on a videoconferencing system that demands as little bandwidth as iVisit remains essential.

When conditions conducive to innovation are acknowledged to be present, there is a tendency for:

- administrative and professional development activities to be carried out through iVisit;
- learning activities to be carried out by the students.
More specifically, with respect to the “knowledge and skills (pedagogical)” condition conducive to innovation, the more prevalent the condition is among the interveners, the greater the number of student learning activities observed on iVisit.

Activity on Knowledge Forum

The use of this tool gradually increased during the two years of phase 2, to over 15 000 written contributions all written during that time. Students wrote some 88% of the notes.

Knowledge Forum is a tool used, above all, in asynchronous mode with the students in a given class or by students in different classes. Starting with a complex question, they draft notes that offer a response to the question or contribute to an understanding of it. Frameworks are provided to help them (in orange):

Four types of written discourse were pinpointed when these contributions were analysed:

- **Cumulative discourse**: Contributions to this type of discourse have repetitive informational content and are approved without justification.
- **Record-keeping discourse**: A type of discourse that leads to the depositing of information.
- **Parallel discourse**: Contributions to this type of discourse consist in disjointed exchanges of unsupported opinions. Little or no consideration is apparent in such discourse for other people’s ideas.
- **Knowledge building discourse**: This type of discourse proposes sound, coelaborated ideas.

In the elementary sector, among the pilot and partner schools overall engaging in networked activities, the more extensively conditions conducive to innovation were acknowledged to be present, the more extensively observers noted the presence of:

- knowledge building discourse in the notes that students wrote;
- questions demanding explanatory and interpretive elaboration by the students.
In the secondary schools, the extent of the presence of conditions conducive to innovation varied less (level 3 was absent\textsuperscript{5}) from one school board to the next and we cannot clearly estimate their effect on the classroom system.

Thus, without the sufficient presence of the conditions conducive to innovation identified earlier and the RNS system of practices that such conditions engender, teachers cannot possibly establish and maintain such an enriched learning environment for their students in order to better promote their academic success. This appears to occur, above all, when direct teacher-student(s), student-student(s) interactions in the classroom combine with interactions that become possible by means of tools such as iVisit and Knowledge Forum. It is what transforms the classroom into a networked learning community.

Students who learn in such an environment must cooperate with their peers in the class and peers elsewhere during oral or written exchanges or when they carry out brief research on real problems linked to the curriculum. The students are put in a situation where they must colearn and, indeed, engage in knowledge building when they express or enhance an idea put forward. The process thus broadens the students’ responsibility. Emphasis is placed on writing but also on the reading of texts, not necessarily the easiest ones, which contribute to the collaborative inquiry in which the students are engaged.

Even the role played by the students is altered in a networked classroom. Two roles appear:

- mini-prof: students help other students by asking them questions and communicating what they know about the question being asked. They encourage, occasionally congratulate and, indeed, argue to some extent with peers;

\textsuperscript{5} The three levels of presence at the outset were: condition conducive to innovation present (level 3), under development (level 2), absent or undetermined (level 1). To attain the third level, a school board had to rank in the highest category for each of the eight conditions conducive to innovation.
• investigator/researcher: the students ask questions, answer their peers’ questions, read what their peers write, summarize (notes to enhance the level of discourse) written discourse and ensure that it advances.

The results obtained in phase 2 show that the student’s activity, as an activity system in itself, changes more extensively in elementary schools than in secondary schools bearing in mind that the students function somewhat more often in a networked learning community.

**In the elementary sector**, among the pilot and partner schools overall engaging in networked activities, the more extensively conditions conducive to innovation that gave rise to the implementation of an RNS system of practices were acknowledged to be present, the more extensively the students’ performance reflected:

- the use of new words in their written contributions (enrichment of vocabulary);
- better results on the written comprehension test (PIRLS) (this result applies only to grade 4 students).

The intrinsic, identified motivation (good type of extrinsic motivation) in reading among students in the pilot schools does not diminish significantly, although it did weaken in partner and control schools. Moreover, motivation in writing does not decline in the pilot schools but does so in the partner schools. We must take into account the frequency of networked activities when we examine results from the standpoint of motivation. In schools where activities were less numerous, we cannot anticipate changes in the students’ motivation since the classroom practices remained essentially the same.

**In secondary schools**, the results obtained with respect to the students’ learning are linked to the difficulties that teachers are facing. Even in small schools, the teachers are striving to overcome the status quo to implement and maintain a system of networked activities. This does not mean that, in relation to elementary schools, less effort was made in the secondary schools to establish the conditions conducive to innovation likely to lead to a system of RNS practices. However, it does indicate the high degree of crystallization of practices in secondary schools, which makes difficult the desired change of practice in such a context.

The following results were obtained:

- From the standpoint of vocabulary enrichment, while in the elementary schools the number of new words on Knowledge Forum is represented by an ascending curve throughout the four periods delineated for measurement purposes, in the secondary schools, this curve diminishes in the fourth and final period.
- In terms of reading comprehension, while in the elementary schools all of the students obtained significantly higher post-test than pre-test results, in the secondary schools we noted a decline in the results of the schools overall where the test was administered in the spring of 2005 and in the spring of 2006.\(^6\)

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\(^6\) It should be noted that an education reform is in progress.
• The presence on Knowledge Forum of questions that require explanation-interpretation responses is linked to better results in reading comprehension.

When change is under way, ambiguous results are not unusual since a new system of practices is being implemented. Moreover, it is the resolution of tensions or contradictions that, according to Engeström’s model, reveals that a genuine change has occurred. The use that was made of the two telecollaboration tools emphasized in the Remote Networked Schools initiative and the results obtained display their own contradictions. The main contradictions noted are indicated below.

• **In the elementary schools**, on sites where greater numbers of activities relied on iVisit (professional development activities and student learning activities), we observed higher motivation among elementary school students. Furthermore, the more extensive the activities on iVisit (professional development activities and student learning activities), the poorer the results observed in reading comprehension in the elementary schools.

• **In the secondary schools**, on sites where a greater number of student learning activities relied on iVisit, we observed no diminution of reading comprehension results. However, explanation-interpretation questions appear to diminish, and interveners’ knowledge and skill (as perceived) to increase.

Does this mean that a bigger professional development effort is required? The research team recommends, with regard to elementary school students’ learning activities and projects, the use of iVisit concomitantly with Knowledge Forum. It would also be advisable for activities on Knowledge Forum to be spread more extensively over time so that students can broaden their learning by means of this tool, e.g. the meaning of words that they do not understand, and for the team to examine, in the context of the RNS initiative, the hypothesis of a positive relationship between knowledge building and reading comprehension.
CHAPTER 3
CONSOLIDATION OF THE NETWORKED SCHOOL

Stages in the adoption of the Remote Networked Schools initiative

Three stages of innovation are apparent in the RNS initiative, i.e. adoption, implementation and institutionalization. These stages correspond to key points in the RNS design and implementation through a knowledge building process.

The adoption stage of RNS “as an idea to be built upon and put to test” is the stage in which plans are developed. It demands of the school board the intention to promote new ways of doing things using Internet as a support and requires a commitment from numerous interveners. This stage assumes that interveners envision what a networked can be on its territory, that they perceive what the networking of small schools can offer, and that they have in mind certain objectives with respect to results. Moreover, it is at this point that team decisions intervene: project planning and coordination, the division of tasks when teachers are twinned, the allocation of resources outside the classroom, the choice of incentives to support innovation, the physical organization of equipment, the availability of time and resources, and so on. The students are the focal point of the process inasmuch as they participate in new classroom processes, assume new responsibilities, and are put in learning situations that rely on problem-solving. Collaboration tools serve as a lever to support the emergence of renewed professional practices among teachers and educational consultants. With these tools new and different learning situations can be structured, ones that remain closely aligned with the curriculum.

In schools that have not gone beyond the adoption stage, we have noted insufficient conditions to advance the Remote Networked Schools initiative. Efforts are made at some levels but the cohesiveness of action overall is limited. The initial plan takes shape poorly, innovation is hardly sustained, and the networking of schools does not make sufficient sense for the interveners to genuinely get involved in it. New routines fail to appear or appear to a very limited extent, which makes it hard to proceed to a higher level of innovation.

The implementation stage of the RNS model leads to greater cohesiveness of the new practices implemented in the classrooms, in the decisions made by school board directors and school principals, and the new practices adopted there. What happens when the school advances from the adoption to the implementation stage?

- The directors invest (availability of resources), school principals are creative and attentive to the obstacles that arise, they introduce favourable conditions such as the timetable, the choice of tasks, and support from pedagogical and technical advisers.
- Interveners master the basic elements of the technological tools and use them for students to improve their ideas instead of considering them solely from the standpoint of practical matters or leisure.
- Networked activities are included regularly in the participating classes and are conducted in a natural, integrated manner and spur the students to assume increasingly active roles. These activities emphasize coconstruction between the students and lead to the enrichment of the students’
vocabularies, the enhancement of reading comprehension, and students maintain their motivation.

- Leadership spreads increasingly among interveners from the classroom, the school board and the local community.
- The teachers gradually develop a network culture, and concertation at different levels develops.

A majority of the school boards participating in the initiative attained to varying degrees this stage of innovation, depending on the interveners. However, several obstacles arise during the implementation stage, e.g. technical difficulties stemming from insufficient connectivity, high staff turnover in the schools (it is necessary to start all over again with new staff), constraints in the timetables of the classrooms that collaborate, and tension arising from any process of change but exacerbated by the presence of a research-intervention team made up primarily of academics.

Moreover, the nature of the telecollaboration that prevails in the Remote Networked Schools initiative now fosters more extensively cooperation than task sharing. This logic is well suited to conditions in elementary schools but is less obvious in secondary schools. However, the division of teaching tasks in small secondary schools is an important avenue to ensure the adoption of the RNS model. Such adoption requires better coordination of timetables and the diversification of teaching practices in secondary schools. This is a major challenge that must be met to ensure the sustainability of the Remote Networked School model in Québec. It is also a challenge that is having an impact on the current reform of the secondary school curriculum in Québec.

The institutionalization stage of the RNS model marks the outcome of the innovation process. It assumes not only the presence of the conditions conducive to innovation mentioned in the preceding chapter but also the ability to make of the initiative a lever for organizational and pedagogical development in order to ensure the quality of educational services in small schools. This assumes that the school board’s vision, management practices and strategic choices are closely aligned to take into account the conditions in small schools, the challenges facing them and their needs. What might a school territory look like in which the networking of schools takes shape in this way?

- The RNS initiative is part of the school board’s strategic plan, educational project and plan for academic success. This assumes that all of the interveners adhere to this perspective, i.e. managers, local unions, the teachers, parents, and residents of local communities.
- Broadband is sufficient, reliable, available and used to serve the schools’ educational needs. Technological tools are user-friendly and fully supported by the computer teams.
- The initiative is carried out in several schools in the territory so that a significant critical mass of school teams becomes involved in it. Interveners at several levels are involved in the networking of the schools.
- A new form of classroom organization emerges: installation of equipment in the classrooms, familiarization of the students with the technical means available, active roles played by the students in the implementation of technical resources, teamwork among peers, new routines that allow for sufficient time devoted to network-based work (one-third of the time would be devoted to it).
• The reorganization of first cycle of secondary school to foster greater smoothness and flexibility in the actions of teachers (timetable, space and time for collaboration, better control by teachers of the timetable), the sharing of tasks by teachers in different schools, shared responsibility for at least two subjects with the same group of students, mastery of the functioning of work units for groups of students and teachers, time available for multidisciplinary projects, and so on.
• The use of tools linked to subjects in the school curriculum in such a way that strategies for the use of ICTs in the classroom support significant and not peripheral learning.
• The presence on the network of interveners outside the classroom through Internet-based videoconferencing, i.e. educational consultants, Récit advisers, remedial teachers, orthophonists, psychologists, and so on.
• Promotion of the RNS model and knowledge transfers between teachers.
• School principals who take the initiative to foster partnerships with members of the local community.

The attainment of the level of institutionalization now seems more realistic in the elementary schools than in the secondary schools. A critical mass of teachers and school principals is essential for the adoption of the Remote Networked Schools model and we have observed that this is more readily the case at the elementary school level. However, we have noted promising signs in certain milieus that can lead to such a critical mass at the secondary school level.

The attainment of a significant number of interveners in respect of the adoption of the RNS model in a school territory appears to be a key condition to ensuring the survival of this innovation. As we saw in the previous section, these interveners are being challenged from the standpoint of their roles, beliefs and ways of doing things. How can we proceed to foster such critical masses in the future? How can we ensure that the RNS model provides not only a viable response but a durable one to the maintenance of small schools in Québec?

Avenues to be explored and consolidated to ensure the sustainability of remote networked schools

Small schools are not about to vanish in Québec, despite some degree of demographic stabilization anticipated after 2011 in several areas with declining populations. To the contrary, small schools are rooted in local communities, revitalization is coming to the fore and is relying on interveners not only in the education sector but also in the municipal, health and social services and other networks. It is important to examine how the school boards can take advantage of the Remote Networked Schools model to ensure satisfactory delivery of educational services in their territories and that they thus ensure an enriched learning environment in the smallest schools.

Five specific challenges are emerging nearly four years after the RNS initiative was launched. These challenges affect all bodies and interveners in the education sector. While these challenges are put into perspective from the standpoint of this initiative, they are not confined solely to such an initiative. To the contrary, they attest to the changes under way in the education sector, ongoing tension in the transformation of practices and the necessary adjustments in the systems that structure ways of doing things, beliefs and the culture of elementary and secondary education in Québec.
1. **Highlight institutionalization approaches under the Remote Networked Schools initiative**

Several processes are required in the school boards to ensure the viability and sustainability of the RNS initiative in their territories: the sharing of information internally and externally with local and regional stakeholders, the coordination of the work of school staff, cooperation between different branches, especially those involved in pedagogical development and computer services, and integration between the RNS initiative and other committees, services and projects engaged in the territory in the management of educational services. Such integration assumes, for example, that account is taken of prerequisites and the initiative’s potential in decisions concerning the allocation of human resources, remuneration and funding policies, the organization of services, and so on.

Moreover, the management culture specific to each school board affects the manner in which the RNS model is institutionalized, as does the school board’s history, geography and school clientele. Leadership can first emerge among senior managers and the educational services branch, or among school principals. It is important to pay careful attention to the manner in which the RNS model can be harmoniously, efficiently adopted in a milieu and provide the appropriate conditions to ensure the initiative’s success. Simply stated, to foster sufficient critical masses of classes and schools in conjunction with the RNS initiative, it would be to the advantage of decision-makers to capitalize on the leadership displayed by certain interveners, regardless of where they are, and coordinate their decisions in order to expand this core.

2. **Open up viable avenues for the Remote Networked Schools initiative in secondary schools**

The RNS initiative is being hampered in secondary schools by the type of organization that governs such schools, i.e. the division into disciplines, school organization, tension stemming from the curriculum reform agenda, and so on. The dominant culture in secondary schools does not encourage twinning between teachers, above all when a small secondary school is networked with a bigger school.

However, the impending implementation of the new curriculum organization and its three educational streams provide a worthwhile incentive to transform practices and review the organizational and pedagogical configurations in the secondary schools in a territory. In this respect, the RNS model offers the means of fostering a better array of services in these small schools.

Avenues such as networked coteaching, which is even more clearly delineated in 2006-2007 in the second cycle of secondary school, are noteworthy means of enhancing the learning environment of small groups of students. The sharing of subjects between teachers who are responsible for several subjects may be of interest, as is the realization of the same learning project by two or more classes. However, such practice has not been sufficiently achieved in classroom routines and has often been
confined to one-off projects. What is at stake here is the gradual transformation of teachers’ practices, sustained collaboration with colleagues, and the sharing of tasks and responsibilities that benefits to students.

3. Foster network-based intervention

The RNS model has made it possible to experiment with network-based intervention in recent years, i.e. network-based support practices, especially between the research-intervention team, expanded to include certain Récit advisers, school teams and educational consultants. Network-based intervention assumes that interveners partly modify how they deal with an adult or a young person by introducing technological tools, including Internet-based videoconferencing.

Both auxiliary services in the school boards and teams of educational consultants, Récit advisers and computer technicians could alter their work practices to introduce this way of doing things. Savings in time and money and more effective intervention would certainly result from such a move. The challenge lies, of course, at the level of work practice that changes to give way to reliance on the network, i.e. how to rethink one’s work for a geographically dispersed clientele, how to ensure appropriate intervention by combing direct contact and the network, and how to organize the resources of an entire service optimally in this context. Management concerns and challenges linked to the quality of professional practices are both at stake.

Network-based intervention, by fostering reliance on fibre optics in the regions, network culture and the maintenance of a sufficient level of professional services, could certainly contribute to the scalability of the Remote Networked Schools model, the viability of the community school, and the display of leadership in the education sector to respond to the challenges posed by the maintenance of public services in small communities.

4. Develop the expertise of future teachers

Small schools are the principal workplace of future teachers, who usually start their careers in such schools. Teacher education programs do not sufficiently prepare them to intervene in such schools, where classes with students of different ages are common. Moreover, future teachers have not developed during their professional education courses the network culture and the adoption of technological tools that can adequately support learning situations of this kind.

Pre-service teachers might certainly be more extensively encouraged to work in these schools and their instructors could supervise them through the network. There are worthwhile avenues here to bring closer together small schools and the faculties of education in the region’s universities. Furthermore, the universities could examine with local communities forms of collaboration to facilitate practica for pre-service teachers and to attract new teachers.
5. **Involve more extensively school principals’ and teachers’ representatives**

School principals and teachers are especially affected by the advancement of the Remote Networked Schools initiative. Moreover, we must involve their local and regional representatives in the perspective that the innovation proposes, and in the strategies, challenges and obstacles stemming from its implementation. The application of the results, the reactions of those involved in the innovation, the sharing of solutions, and common reflection on the enhancement of the students’ learning environment are necessary to ensure more extensive adoption of the model and sufficient critical masses. This facet is usually neglected for want of time. However, when it is emphasized, significant mobilization can result. From one group of innovators, the network is gradually expanded to encompass other interveners.

By more extensively involving school principals’ and teachers’ representatives in the adoption of the Remote Networked Schools model, we can thus take into account new facets of the professional development of these groups of interveners. Networking and peer collaboration open up worthwhile avenues to support professional development at the local, regional or provincial level. Once again, the realization of these new forms of development can benefit from the Remote Networked Schools initiative in Québec.
CONCLUSION

The leadership displayed by the education sector with regard to new uses of fibre optics in the regions remains fragile. Time, attention and perseverance are needed to make concrete the perspective of the renewal of educational services in small communities.

There is implicit in the Remote Networked Schools initiative an ambition that demands significant changes in practices in the education sector. Such changes cannot be achieved overnight. To the contrary, they assume day-to-day management by interveners in the school system, ongoing sharing of conditions that foster such change, and strong leadership to stay focused on the meaning of the desired changes.

The 2006-2008 phase will be critical to ensure the viability of the Remote Networked Schools model in small elementary and secondary schools in Québec. Let us hope for the emergence of promising practices and creative solutions to overcome the obstacles that necessarily arise against a backdrop of innovation and change. Let us also hope that growing numbers of teachers perceive in the RNS model a means of enriching their students’ learning and their own professional practice. From 10% of rural schools participating in the RNS initiative in Québec, it would be desirable for this proportion to double by 2008 and thus confirm that the institutionalization of these practices is possible.
APPENDIX 1

Ely’s conditions of change

Ely (1999) specified eight conditions of change that facilitate the implementation of educational technology innovations. We have adapted the conditions and consulted the community of practice made up of RNS principals. The conditions are defined, and adapted, below.

1. **Dissatisfaction with the status quo**
   Interveners know that there are new technological and conceptual tools (learning theories) to overcome professional and social isolation, make education more accessible to young people and adults in their community, and enhance efficacy from the standpoint of educational motivation and academic success. They no longer wish to accept the status quo and do not want the local school to close.

2. **Knowledge and skills (technical and pedagogical)**
   The pedagogical knowledge and technological skills of interveners involved in networked schools provide useful background knowledge. The screen is not a barrier when they use the tools (iVisit and KF) and interveners know how to involve students in activities in which interaction with other students for educational purposes is emphasized. In addition, the interveners collaborate among themselves.

3. **Adequate resources**
   The necessary resources are available, i.e. the material resources (connectivity, computers, cameras) but also the human resources (just-in-time pedagogical and technical support) to ensure the success of the RNS.

4. **Time**
   The organization of time must allow interveners to master the tools and adopt the policy directions and pedagogical foundations of pedagogical renewal. They must subsequently have time to plan, discuss and reflect on learning situations in the RNS.

5. **Participation**
   Key interveners, mainly teachers, should be involved in decisions concerning the implementation of the RNS (planning, execution and evaluation of networked activities).

6. **Commitment**
   Interveners should have the feeling that school board officials are determined to develop the RNS and are prepared to support them actively in the implementation of new practices.

7. **Leadership**
   The school principal’s involvement is achieved through guidance, assistance, encouragement and support for teachers in respect of the planning, execution and evaluation of RNS activities. The use by school principals of the tools (iVisit et KF) will give them, and teachers, valuable practical knowledge.

8. **Reward or incentives**
   Incentives should be present that motivate teachers to get involved in innovation, along with rewards for teachers who have already made innovation part of their practice.
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