PLANNING THE INTEGRATION OF NICT INTO THE SCHOOL

SUGGESTIONS FOR PREPARING A SCHOOL PLAN

For use by schools and school boards within the framework of the plan of action to support the integration of new information and communication technologies (NICT) into the schools of Québec

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This document, links to Internet sites, some of the reference materials, and other useful information for preparing a school plan are available on the Web site:
http://www.eduq.risq.net/DRD/planific/intro.htm

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1. INTRODUCTION

At the end of June 1996, the Minister of Education announced a plan of action to support the integration of new information and communication technologies (NICT) into teaching and learning methods.

Used for teaching purposes, NICT can contribute to the development of intellectual skills, critical thinking, problem-solving skills, and the ability to communicate. The school should therefore embrace these technologies in order to benefit fully from their potential in the production and dissemination of knowledge.

The action plan, which is spread out over five years, provides for annual investments of $41.5 million for construction and $4.3 million for operations. The capital costs budget represents 70 percent of the expenditures in a shared-cost program. The school boards' share will be $17.8 million annually. The total cost is thus expected to reach $318 million over five years.

There is a consensus on the fact that all students should benefit from the new technology and that, in order for the integration of NICT to be successful, it should be based in the school. The personnel of each educational institution is thus asked to draw up an individual school plan for integrating NICT, based on the needs of the students and the ends and means established by the school. The role of the school boards will be primarily to consolidate the integration plans of the schools and provide support in their implementation.

The school plan should show how the school and school board intend to organize the integration of information technology, especially their responsibility for staff training and acquisition of computer equipment and computerized instructional materials.

The purpose of this document is to provide suggestions, comments, and information on the process of drawing up a school plan. Another document, the *Guide for Developing a School Plan,* provides a more concise guide to the place of the school plan in the context of the action plan.

References

For further information on how to obtain documents, see section 6, the bibliography.

Conseil de la science et de la technologie du Québec. *Banking on Knowledge - Status Report 1994, Section 2, New Information Technologies* (consulted 10 February 1997):
http://www.cst.gouv.qc.ca/cst_publ.html
This page provides an English summary of the original document in French, which is also available.

Québec. *La ministre de l'éducation dévoile son plan d'intervention sur l'utilisation des nouvelles technologies de l'information et de*

la communication à l'école (consulted 10 February 1997). Press release, 27 June 1996:
http://www.gouv.qc.ca/cpress/c960626.htm
The full text of the plan is also available:
http://www.meq.gouv.qc.ca/nti_plan/plan_nti.htm
This plan was announced by Minister Pauline Marois on 26 June 1996 at the INET 96 conference in Montréal.

Québec. Commission for the Estates General on Education. *The State of Education in Québec* (consulted 10 February 1997):
http://www.uquebec.ca/menu/
This site provides the main publications of the Commission: description of the current situation, highlights, summary of regional conferences, information documents (folders, list of Commission members, calendar, mandate, etc.), press releases (agendas, calendar, etc.), summaries of more than 1000 briefs, and more than 350 briefs for which it received computer files.

Secrétariat de l'autoroute de l'information. Comité consultatif sur l'autoroute de l'information. *To Devise a Strategy to Implement the Information Superhighway in Québec. Summary of the Working Paper* (consulted 10 February 1997):
http://www.sai.gouv.qc.ca/sai_pdf/anglais.pdf

2. THE MINISTER'S PLAN OF ACTION

2.1 OBJECTIVE OF MEASURE 50590 REGARDING THE ACQUISITION OF COMPUTER EQUIPMENT

The objective of this measure is to facilitate the integration of information and communication technologies into teaching and learning methods. The overall target ratio for the schools is one computer for ten people, for both teachers and students.

2.2 BUDGETARY MEASURE FOR THE EQUIPMENT ACQUISITION PROGRAM (50590)

(Section 2.2 is the text of the budgetary measure, 1996 version.)

2.2.1 DESCRIPTION

Within the framework of the Minister's plan of action on information and communication technologies in preschool education, elementary education, and general education in the youth and adult sectors in secondary education, this measure is aimed at financing part of the acquisition costs of computer equipment for schools and adult education centres.

The computer equipment acquired in accordance with this measure must be used directly by the students for their learning or directly by the teachers for their planning, teaching, and educational management activities.

Computer equipment is intended in the broad sense. It includes microcomputers equipped with operating systems and, where appropriate, integrated basic applications suites. It also includes peripherals and internal and external networking connectivity.

2.2.2 ALLOCATION NORMS

The allocation of resources takes into account the resources available and the priorities of the Ministère.

Equipment is allocated to school boards that submit to the Ministère a consolidated plan of the school plans as defined in the *Guide for Developing a School Plan* produced by the Ministère.

For 1996-97, the allocation to a school board that has presented a consolidated plan is determined by finding the product of the following figures:

- the student population enrolled in general education in the youth sector on 30 September 1995, according to the DCS system as

of 9 February 1996, and the student population enrolled in general education in the adult sector in the 1994-95 school year; these figures are converted to full-time equivalents;
- the amount of $37.80 per FTE student.

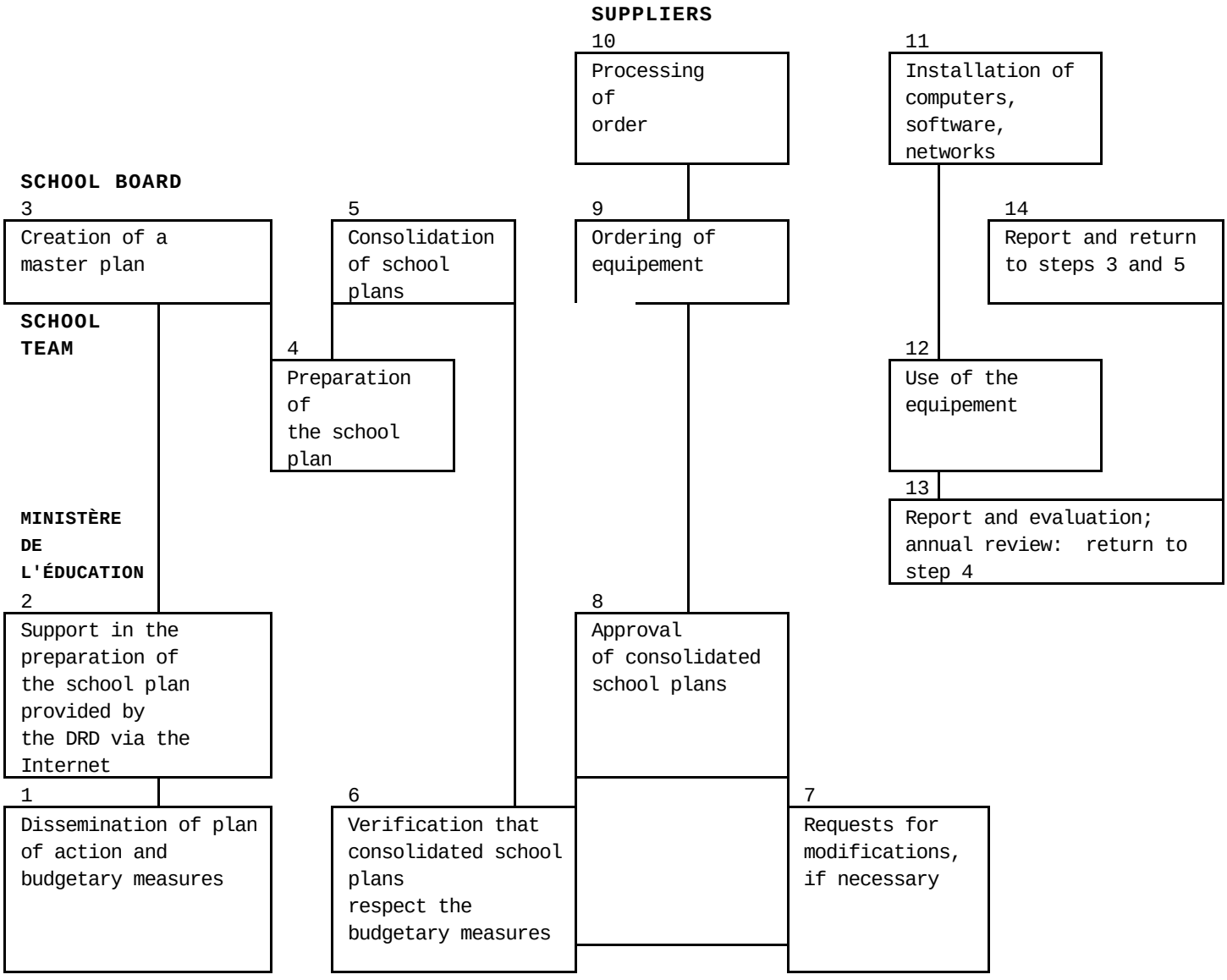
The allocation may not exceed 70 percent of the total acquisition cost to the school board of the computer equipment as defined above. The school board must finance the remainder.

In its analysis of the school board's financial report, the Ministère may carry out any controls it deems appropriate with respect to the expenses incurred for each allocation made within the framework of this measure.

For 1996-97, a special allocation of $30 000 will be given to each regional or supraregional Centre d'enrichissement en micro-informatique (CEMIS, or centre for computer applications in education) to allow them to upgrade their computer equipment.

2.3 IMPLEMENTATION: WHO DOES WHAT

CIRCULATION OF INFORMATION AND TIMETABLE



1. The Ministère makes known the budgetary measures, the framework for the school plans of the individual establishments and for the consolidation of the school plans by the school boards, as well as the responsibilities of each level.

2. The Direction des ressources didactiques prepares self-training documents, suggests resources that may be useful in planning, and sets up a Web site where useful information is easily accessible in electronic form.

3. Each school board adopts orientations, which may take the form of a master plan drawn up in consultation with its establishments. These orientations should be disseminated before the schools prepare their own plans.

4. When they are ready, the schools must present to their board a plan that is consistent with the board's master plan. The centres for computer applications in education (CEMIS) offer support to the schools in preparing their plans.

5. The school boards make a synthesis of all the school plans with or without the board's orientations: this is the consolidation of the school plans. The master plans are reviewed annually. The boards make sure that the school plans are consistent with the board's master plans and the framework and rules of the Ministère. The consolidated school plans may be submitted at certain times during the year so that the computer systems may be operational in the school when needed.

6. The regional offices see that the school plans respect the budgetary measures.

7. The regional offices may ask for corrections of specific aspects of the school plans.

8. The regional offices approve the consolidated school plans.

9. The school boards order the computer equipment.

10. The suppliers process the orders.

11. The computers are installed and connected in a network; the software is configured; the network may be connected to the Internet.

12. The teachers and students use the computers.

13. At the end of the year, the school administration makes an evaluation report on the application of the plan in the school; this is the starting point of the annual review of the school plan.

14. The school board submits a report to the Ministère with its new application.

3. PREPARING THE SCHOOL PLAN

This document does not describe in detail the method to follow to prepare a school plan or form work groups; rather, its purpose is to outline the content of a school plan. There are guides in English and French on planning methods and the organization and functioning of a committee in charge of preparing a school plan, such as *Teaching, Learning & Technology—A Planning Guide* from Apple or those in the *Computerizing the School* collection published by École informatisée Clés en main (EICEM), especially *Introducing a Plan for Integrating Information and Communication Technologies into the School* and *Guide to Writing Implementation Plans.* In addition, references to Web sites that provide a great deal of documentation on how to proceed are given at the end of this document.

References

Anderson, Larry. *National Center for Technology Planning* (consulted 9 September 1996):
http://www2.msstate.edu/~lsa1/nctp/
This site provides access to American resources on the subject, including a planning guide.

Apple. *Teaching, Learning & Technology—A Planning Guide.* Cupertino: Apple, 1995.

Basque, Josiane. *Strategies for Integrating Information and Communication Technologies into Schools (Thirty Recommendations).* Montréal: EICEM, 1996.

Columbia University Institute for Learning Technologies. *ILTweb: LiveText: Technology Planning* (consulted 9 September 1996):
http://www.ilt.columbia.edu/k12/livetext/resources.html
This site has links to 13 planning guides and 7 sites on ethics, copyright, censorship, and other subjects.

Guidotti, Johanne. *Introducing a Plan for Integrating Information and Communication Technologies into the School.* Montréal: EICEM, 1997.
This publication is a tool for planning the integration of NICT into teaching and learning. To order it, see École informatisée Clés en main in the bibliography.

Massachusetts Software Council. *The Switched-On Classroom*™ (consulted 10 September 1996):
http://www.secouncil.org/switch2.html
This is an on-line planning guide for integrating NICT into the classroom, in 12 steps and 250 pages. It contains analyses and suggestions as well as other resources and case studies.

3.1 The Framework of the School Plan

Each school should prepare a plan that will be part of the school board's consolidation. Since educational institutions at both the elementary and secondary levels will be discussing planning, it is useful for them to have a common vocabulary.

The following table shows the basic content of a school plan, which is explained in section 3.2.1, "The Five Components of a Plan," and section 3.2.2, "The Five Dimensions of Planning," and dealt with in detail in section 4, "Recommendations on Preparing a School Plan."

The generic term *school* includes adult education centres as well as schools in the youth sector. The generic term *teachers* includes regular teachers and specialists. Finally, the term *pedagogical team* includes the entire school staff and the parents.

Our school plan is:	The Current Situation	The Vision	The Medium Term	The Short Term	Budget
A pedagogical plan: a plan for integrating NICT into teaching and learning	Description of the school What the school has done so far with respect to NICT	Role of NICT in teaching and learning Vision of the school of the future	Performance objectives for the students with respect to NICT Role of NICT in programs of study Management of computer resources	Projects or activities Connections with programs of study Instructional materials and equipment needed	One-year budget Three-year budget
A training plan: a plan for providing staff training and support	Skills of the pedagogical team Evaluation of training Recent training in NICT	Training model Support model Roles and skills of staff in the use of NICT	Content of training Skills to be acquired User support plan	Training (pedagogical and technical) and support activities Resources available for training and support	One-year budget Three-year budget
A technological plan: a plan for implementing the technology	Computer equipment in the school Technological environment in homes (staff and students) and in the community Technological support	Technological development and future possibilities	Equipment purchasing plan Network implementation plan Equipment sharing plan Technical support plan Security plan	Acquisition and management of equipment Equipment sharing in the school Technical support measures Security measures	One-year budget Three-year budget

In addition to the above information, an **outline of the school plan** should be provided for use in communications with parents, students, the community, and the local media.

3.2 PROCEDURE

Very briefly, the procedure the pedagogical team should follow to prepare a school plan is to describe both the current situation and their vision (which implies becoming informed about the possibilities of these technologies as teaching and learning tools), and then to plan for the short and medium term. In addition to these basic elements, a summary of the plan, the budget, and (starting in the second year) an evaluation of the achievement of the objectives that have been set are required. The medium- and short-term planning may be organized somewhat differently, with each project or group of activities structured as shown in section 3.1, "The Framework of the School Plan"; in this case, the main headings will be the names of the projects, and the subheadings will correspond to the areas presented in section 3.1. E.g.:

Project 1
- Pedagogical plan
- Training plan
- Technological plan

A combination of the two methods may also be used. What is required is that the material be organized in the form best suited to the information presented.

3.2.1 THE FIVE COMPONENTS OF A PLAN

1. The **summary of the school plan** is a short presentation of the essentials of the plan. It is attached to the school board's application for funding. It may also be disseminated more broadly to provide information on the school.

2. The **plan for integrating NICT into teaching and learning** describes the role planned for NICT, the objectives sought with respect to the programs of study and the students' skills, taking into account the characteristics and orientations of the school.

3. The **plan for providing staff training and support** describes the ongoing training to be provided for the school staff and the training and support to be provided for the users of the technology.

4. The **plan for implementing the technology** describes the development of the technological infrastructure of communication and covers all technological questions, such as the selection of the equipment and technical support.

5. The **evaluation** compares what has been done with what was planned. The administration should evaluate the results and report annually.

3.2.2 The Five Dimensions of Planning

1. The current situation presents an analysis of the situation with respect to the school's staff and students, computer equipment, methods, and problems. This analysis should be done annually; in fact, to avoid unnecessary work, the previous year's evaluation report may serve as a description of the situation at the beginning of the current year.

2. The **vision** involves setting your broad objectives and determining your orientations for the next five years or more.

3. The **medium term** describes the objectives and goals to be attained, which concretize the school's vision of the future and its ultimate goals, and presents the path and the steps to be taken. This is the most detailed part of the plan, in which the objectives for the next three to five years are described.

4. The **short term** focuses on actions that are to be carried out in the coming year, the timetable, the strategies, the order of the various tasks, the financial and human resources needed, follow-up, and methods of evaluation. It is a **yearly project management tool.** It must thus be redone at the beginning of every year.

5. The **budget** consists of the funds needed for the equipment acquisition program, with everything to be purchased listed by category, and those needed for any other actions that are part of the plan.

3.2.3 Annual Review of School Plans and Application for Funding

The school plans (and thus the consolidated plans produced by the school boards) and the strategic choices or orientations of the school boards (which may take the form of master plans) should be reviewed annually. This is necessary, on one hand because the technology is developing very quickly, and on the other hand because it makes sense to examine certain choices to make sure that they are still appropriate. It may happen, for example, that a drop in prices and the simplification of the technology make it possible to purchase equipment that was previously unaffordable. Similarly, problems of incompatibility (Macintosh, PC-compatible, Windows 3.1, Windows 95, Windows NT, Unix) diminish in importance where the information highway is concerned.

Furthermore, as the general population begins to master the new technology, what was once the prerogative of a minority is becoming more common, and this makes it possible to improve the technology. It is therefore necessary to review certain aspects of the school plan.

The annual review (and every new application for funding) involves:
- reporting on the actions that have been carried out in the course of the year;
- evaluating the results from the previous year;
- producing an update of the school plan for the board, emphasizing what is new in it and stating the new funding requested; this

update will serve as a new annual plan, and will include minor (and not, let us hope, major) corrections to the other parts of the old plan.

3.2.4 Possible Strategies, Depending on the School Context

Preparing a school plan may be a long, complex endeavour. The sources consulted (see section 6, the bibliography) speak of a school year's work for the group involved, all other things being equal.

But all other things are not equal in schools. For some people, the task will take longer. In schools where computer-assisted learning (CAL) has hardly been implemented, preparing a plan will involve carrying out limited experiments at the same time as information is being gathered with whatever means are available. Hence the urgency of beginning to prepare the plan as soon as possible and taking advantage of the resources available. This does not mean, however, that every school must finish its plan in the 1996-97 school year. A pedagogical team that feels less ready can decide to start by gathering information and gaining a little more experience before taking on this task.

In schools where CAL has been moderately implemented, it will be possible to begin thinking about a plan.

Finally, there are some schools that not only have a great deal of experience with CAL but also are very familiar with NICT. The teams in these schools will be able to modify their existing plans or to make explicit what is implicit in them (which can be done in a relatively short time).

A few schools may become pilot projects. This requires a more ambitious plan, which may take more time. It may also require more funding than that available.

It is even possible to envision a school plan as an ongoing project that may continually be improved, so that the submission of the first version at the end of the first year does not mean an end to the process. This type of plan may take a very different form in the second year, once the information has been assimilated and thought about further.

One of the major elements that has to be taken into account is the relationship of the school plan to the school board's master plan. The school board's orientations may have elements that directly affect the school plan. In some regions, the school boards have joined together to create a regional action plan. Some of the information and answers needed for preparing a school plan can come from the school board.

To situate the preparation of the school plan in the overall process, see the diagram in section 2.3, "Implementation: Who Does What."

4. Recommendations on Preparing a School Plan

This section contains questions, suggestions, examples, reflections, and references to documents that may be useful in the preparation of a school plan. They do not in any way constitute rules or obligations, but rather aids in creating the plan. We have tried to include as much material as possible; you may pick and choose what you need.

This section could continually be added to, insofar as all the knowledge in the field, both existing and future, could be included. This expansion of knowledge is partly reflected in the inclusion of Internet tools (Web sites and discussion groups).

References

Commission des écoles catholiques de Montréal. *The CECM's Institutional Project* (consulted 17 February 1997): **http://www.cecm.qc.ca/anglais/institutional_project.html**
The school board with the largest number of students in Québec presents its strategic choices.

Université Laval. Faculté des Sciences de l'éducation. *Instituts et réseaux de recherche* (consulted 10 September 1996): **http://www.fse.ulaval.ca/fac/href/data/instit.html**
This is a list of links to sites that provide a great deal of information for use in planning.

4.1 The Current Situation

References

Conférence socio-économique sur les nouvelles technologies de l'information et des communications en éducation. *Partenaires de demain - État de la situation* (consulted 10 September 1996): **http://www.gouv.qc.ca/français/minorg/medu/con_soec/intermed.htm**
This site provides a text describing the situation of NICT in Québec in January 1996, at the time of this conference, which was followed by the announcement of the Ministère's five-year plan of action.

4.1.1 The Situation with Respect to the Integration of NICT into Teaching and Learning

The section on the educational situation may be briefly reviewed every year since the situation changes from year to year.

DESCRIPTION OF THE SCHOOL

How would you describe your school and the population it serves? What data do you have on people's attitudes, the equipment (in general), the programs of study, and the technology? What attitudes on the part of the staff and the students and their families could affect the success of your plan? For example, will the parents be willing to give more time to the school?

Can you describe the social context of your school? What forces for change exist in the community (e.g. single-parent families, increasing numbers of immigrant students, an increase in the number of retired people, the cutting back of social benefits, the increasing insecurity of employment, the increase in self-employment, the proliferation of new technologies, the emphasis on training in a knowledge-based economy, the generation gap)? What are the consequences of these forces on your school (in some cases there may not be any, because these factors may be absent)?

You should describe the population served (cultural backgrounds, average age, average household income, average individual income) as well as the evolution of the student population over the years.

What changes are occurring at the local level? Have post-secondary educational institutions changed their criteria for admission? Is there a need for large-scale retraining as a result of the closing of a local plant?

Here is where you should bring in the school's educational project. Should it be reviewed? If so, this task should be included in the medium-term planning.

What are the students' expectations with respect to their school?

Does the school explore ways of motivating the students? Does it perhaps rely too much on their perseverance? Should it not put greater emphasis on motivation based on the desire to learn? Does it use pedagogical methods that promote this kind of motivation? (Paquette, Francoeur, and Desautels; for further information, see the bibliography in section 6).

WHAT THE SCHOOL HAS DONE SO FAR WITH RESPECT TO NICT

How the Teachers Use NICT

What programs of study have NICT been integrated into (taking into account CAL)? What kinds of activities have the teachers mastered? How are computers used for office automation and educational management? How are they used in teaching? What instructional resources are available?

What proportion of the teachers have computers at home? What proportion have a connection to the Internet or an electronic bulletin board? How many have a multimedia computer at home?

What are these proportions for the student population and for the parents? What are they for the community and for society as a whole?

How the Students Use NICT

What objectives have been attained by what proportion of the students with respect to the mastery of NICT or part of a program of study using NICT? How do the students use NICT at home? What perception do the students have of NICT? What is their attitude toward NICT in the school? Do they see NICT as serving more for learning or for play? How does the students' situation compare with that of the teachers and that of their parents? How does it compare with the situation in the community and in society as a whole?

References

Centre francophone de recherches sur l'informatisation des organisations. *Info-CEFRIO, Montréal,* vol. 8, no. 1 (January-February 1995).
http://www.cefrio.qc.ca/infv8no1.html
The CEFRIO has published data on the computerization of Québec businesses in 1995, which constitutes a reference point for comparing the schools with the world of work.

Nielsen. *Nielsen Media Research—Interactive Services* (consulted 11 September 1996):
http://www.nielsenmedia.com/news/hotech-summary.html
This site provides general information on the use of NICT in the U.S.

Nielsen and CommerceNet. *Nielsen Media Research—Interactive Services* (consulted 11 September 1996):
http://www.nielsenmedia.com/commercenet/exec.html
This site provides a survey by Nielsen and CommerceNet that compares Internet use in August 1995 and March 1996, in Canada and the U.S.

Québec. Commission for the Estates General on Education. *The State of Education in Québec* (consulted 10 February 1997):
http://www.uquebec.ca/menu/
This site provides a report on the situation of education in general, the brief presented to the Commission by the Association pour les applications pédagogiques de l'ordinateur au post-secondaire (APOP) in Montréal with the Québec organizations, and a summary of the brief presented by the Association québécoise des utilisateurs de l'ordinateur au primaire et au secondaire (AQUOPS).

4.1.2 The Situation with Respect to Staff Training and Support

SKILLS OF THE PEDAGOGICAL TEAM

What can be deduced about the teachers' skills from the ways in which they are currently using NICT as teaching tools?

In terms of the objectives with respect to mastery of NICT (see section 4.2.2, "Medium-Term Planning of the Integration of NICT into Teaching and Learning"), what skills have been acquired? By what proportion of the staff? What skills have been acquired with respect to the integration of NICT into management and educational activities? By what proportion of the staff?

EVALUATION OF THE TRAINING MODEL USED THUS FAR

Claude Paquette, Paul Francoeur, and Jacques Desautels have made the point that the training of school personnel is based mainly on information, and that the needs are defined on the basis of current notions or, in other situations, organizational priorities. Rarely are the needs determined through rigorous analysis of changes to be made. The effects of training are often left to individual initiative. Finally, according to Paquette, Francoeur and Desautels, the education system is one of the few places where training is organized for staff and administrators without their having any obligation to apply it later.

What efforts have been made in training so far? If there is a training model that is used, either in general or for NICT in particular, are the results satisfactory? What is your assessment at this point? Are you satisfied with the methods used? Have changes been introduced into everyday life in the classroom? Would the model used allow *all* the students to use NICT to learn, guided by teachers who felt at ease in their new support role?

While everyone agrees on the importance of training, is it not the time to question the traditional models for training school staff? What should be done to enable the staff to put into practice what it has learned? What procedure should be used to define the content of staff training? How should the form be determined?

References

Paquette, Claude, Paul Francoeur, and Jacques Desautels. *Jalons d'une école pour tous, Synthèse de la vision dégagée par les groupes de travail de la Mission 95.* Longueuil: ministère de l'Éducation, 1996.
This document deals with a vision of education and long-term objectives. Code 86-0015. An English translation will be available (code 86-0015A).

RECENT TRAINING INITIATIVES IN NICT

Training sessions offered to the staff over the last three years should be listed. Self-training should also be taken into account. The specific skills acquired or developed should be stated.

4.1.3 The Situation with Respect to the Technology

A description of the existing stock of microcomputers and the library of software should be provided every year, or better still, should be updated regularly. It is sometimes surprising to realize how useful this information is to so many people. Has a little database been set up to handle the task? Colleagues in the school and at the board will be interested in knowing what the school has (and, for example, in knowing your assessment of certain hardware or software).

THE SCHOOL'S COMPUTER EQUIPMENT

Ratio of Students to Computers

How many computers are there available to the students? What is the ratio of students to computers?

Ratio of Teachers to Computers

How many computers are there available to the teachers? What is the ratio of teachers to computers?

Upgrading and Obsolescence

Would some of the existing computers be used more if their random access memory and hard disk capacity were increased or they were upgraded in other ways?

What proportion of the computers are used regularly (15 hours or more per week)? What proportion of them are hardly usable or completely obsolete?

What operating system do the computers use? Is it time to upgrade to a new version of the operating system? What new applications would a new version support?

Network

What proportion of the computers are connected to a local area network? How many are connected to a regional network, or to a network linking the school board? Do they have access to the Internet?

Security

Is the software protected against users who are unfamiliar with it, who are careless, or who even want to do deliberate damage? To what extent is the software environment uniform from one user to another and from one computer to another? How much can a user configure the software of any of the computers without hampering other users of that computer?

Technical Support

What resources are used to carry out repairs and install and update equipment? What part of this work is done by school staff?

COMPUTER EQUIPMENT IN THE HOME AND THE COMMUNITY

How many teachers have access to computers at home? How many have access to multimedia computers and to the Internet?

How many students have access to computers at home? How many have access to multimedia computers and to the Internet?

Information should be researched and compiled in order to know how many of the students' parents use computers at work and compare this with other communities and with the average for Québec.

References

Nielsen. *Nielsen Media Research—Interactive Services* (consulted 11 September 1996):
http://www.nielsenmedia.com/news/hotech-summary.html
This site provides Nielsen's survey of the use of technologies in the U.S.

Nielsen and CommerceNet. *Nielsen Media Research—Interactive Services* (consulted 11 September 1996):
http://www.nielsenmedia.com/commercenet/exec.html
This site provides a survey by Nielsen and CommerceNet that compares Internet use in August 1995 and March 1996, in Canada and the U.S.

4.2 Plan for Integrating NICT into Teaching and Learning

4.2.1 Your Pedagogical Vision

Some people may be interested in articulating a vision of teaching and learning using NICT. The following questions may be helpful in that process.

ROLE OF NICT IN TEACHING AND LEARNING

This section deals with your long-term vision of technology and education in your school and the community. What role will technology play in education?

What does it mean to learn? How does technology change learning?

What should be done to develop and improve teaching and learning through technology? What are the advantages for the student? Are there any disadvantages?

In Guidotti (1997), there are many suggestions as to the priority actions to be undertaken.

YOUR VISION OF THE SCHOOL OF THE FUTURE

What should be the final result? What kind of educational action do you want to see in the school of tomorrow?

What will the classroom be like in the future? What will there be in the school of the future?

References

Association pour les applications pédagogiques de l'ordinateur au post-secondaire. *Mémoire de l'APOP aux États généraux de l'éducation* (*Clic,* vol. 1, no. 1, 1995):
http://www.vitrine.collegebdeb.qc.ca/Clic/CLIC1/Memoire.htm

Centrale de l'enseignement du Québec. *Les autoroutes de l'information : enjeux et perspectives,* notes de recherche, no. 35.
This document may be obtained for $3 from the CEQ documentation centre, (418) 627-8888. Code D10304. It will also be available on the CEQ Web site:
http://ceq.qc.ca

Centrale de l'enseignement du Québec. *Il ne suffit pas d'être branchés,* reference document on NICT in education.
This document may be obtained for $3 from the CEQ documentation centre, (418) 627-8888. Code D10313. It will also be available on the CEQ Web site:
http://ceq.qc.ca

Centrale de l'enseignement du Québec. *Les inforoutes et la société du savoir : nouveau défi pour le monde de l'enseignement,* notes de recherche, no. 34.
This document may be obtained for $3 from the CEQ documentation centre, (418) 627-8888. Code D10246. It will also be available on the CEQ Web site:
http://ceq.qc.ca

Conférence socio-économique sur les nouvelles technologies de l'information et des communications en éducation. *Les consensus et les engagements* (consulted 9 September 1996):
http://www.gouv.qc.ca/français/minorg/medu/con_soec/synthese.htm
This conference on NICT and education was held in January 1996 in Québec City. The shared points of view and the commitments of the groups in attendance are helpful for defining a vision of NICT in education.

Conseil supérieur de l'éducation. *Rapport annuel sur l'état et les besoins de l'éducation du Conseil supérieur de l'éducation— Les nouvelles technologies de l'information et de la communication : des engagements pressants.* Montréal: 1994.

New Brunswick. *Report on the Information Highway* (consulted 20 February 1997):
http://degaulle.hil.unb.ca/NB/info_highway/
This page presents New Brunswick's plan for the information highway.

Ontario. Information Technology Directions Committee. *Information Technology Strategic Planning and Directions* (consulted 10 September 1996):
http://www.ccinet.ab.ca/city-of-gp/it_p_ont.htm

Paquette, Claude, Paul Francoeur, and Jacques Desautels. *Jalons d'une école pour tous, Synthèse de la vision dégagée par les groupes de travail de la Mission 95.* Longueuil: ministère de l'Éducation, 1996.
This document is one of the few from Québec that presents a vision of education and long-term objectives. Code 86-0015. An English translation will be available (code 86-0015A).

Québec. Ministère de l'Éducation. Direction régionale de la Montérégie. *The Development of New Information and Communications Technologies: 1995-98 Regional Triennial Plan of Action for the Montérégie Region.* Longueuil: 1995. Code 86-0012A.

Université Laval. Faculté des Sciences de l'éducation. *Instituts et réseaux de recherche* (consulted 10 September 1996):
http://www.fse.ulaval.ca/fac/href/data/instit.html
This is a list of links to sites that provide a great deal of information for use in planning.

4.2.2 Medium-Term Planning of the Integration of NICT into Teaching and Learning

Many people want to use NICT to transform teaching and learning. One of the first things to do in this regard is to translate your vision of the future into general objectives for the students. But before going any further, two types of learning content need to be distinguished.

There is learning that is independent of the program of a discipline and that may be related to techniques, general skills, or even cross-disciplinary skills. There is also learning involving skills that supplement those specific to a particular discipline.
At present, there are no requirements concerning NICT in programs of study. To integrate NICT into teaching and learning, you need to establish educational objectives, methods of evaluation, and possibly even specific pedagogical methods; it is not likely that all programs will be rewritten to include NICT. However, the way in which programs are prepared is very likely to change with the integration of NICT; but this is a local and not a Québec prerogative. Some specific content related to NICT may also be expected to be added to programs.

Thinking about the programs of study is key: most of the planning depends on it. It is not a matter of reinventing everything; rather, you need to ask yourself what you want to do and find reference material to help you think about this. Some teams have already begun this process; in the Montérégie region and that of Laval-Laurentides-Lanaudière, there are teams working to determine what is specific to NICT in the skills profiles of programs.

As is customary, the objectives must be formulated in terms of measurable elements that are directly observable in the students' behaviour.

How will these objectives be attained? What should be done to achieve your vision?

THE PROBLEM OF PROGRAMS OF STUDY

There are two ways of proceeding: either by aiming at the across-the-board application of NICT in a variety of subjects (a general, horizontal approach) or by considering NICT an activity in itself, parallel to the programs (a specialized, vertical approach). In both cases there are difficulties: the programs are already heavy and activities devoted to NICT have to compete with those that are already part of the program. In this context, is it possible to expand from within and add three hours a week to the students' schedule? (Let us note in passing that if the ratio of one computer for ten students is reached, the students can have an average of three hours' access to the computer per week.)

It is preferable to modify the traditional procedures and use NICT as learning tools. For example, a large part of the preschool educational activities that prepare children for reading and writing can be enriched by NICT. Simply using drawing software for major activities introduces children to the value of written communication, the shapes of the letters, and the use of written words (the menu), for example.

On the other hand, many people feel that the results of the specialized, vertical approach that has been used thus far cannot be generalized. This is explained by the fact that the courses in question are optional, and focus on programming. But the long-term goal here is the integration of NICT into teaching and learning practices in all disciplines taught.

MASTERY OF NICT BY THE STUDENTS

What objectives for mastery of NICT should be set for students:
- at the end of elementary school?
- at the end of secondary school?

Some answers concerning the mastery of certain technical aspects can be found in the *Microcomputing* program published by the Direction de la formation générale des adultes (see references below).

The following objectives are presented as guidelines. In reading them, you should be able to quickly identify the skills that are most urgently needed, and thus the learning related to the general or cross-disciplinary skills directly involved in the use of NICT. The list comprises learning objectives in three categories: the computer as an intellectual tool, as a communication tool, and as a self-teaching tool.

The Computer as an Intellectual Tool

Objectives:
- to be able to use the equipment, the operating system, and the network;
- to be able to appropriately use the five main types of applications: word processor, spreadsheet, database, drawing, telematics (electronic bulletin boards and the Internet).

The Computer as a Communication Tool

Objectives:
- to become aware of the possibilities for learning and mutual aid associated with a computer network (such as the Internet), seen as a learning community and means of access to documentary resources (such as multilingual dictionaries, databases, encyclopedias) and distance learning activities (such as a virtual dissection of a frog);
- to make school-related correspondence faster and more motivating (an important asset in language arts or second language learning): the network offers real, stimulating situations for reading and writing as well as the opportunity to publish assignments "world-wide."

The Computer as a Self-Teaching Tool

Objectives:
- to master the skills needed to find and evaluate information that is presented electronically;
- to become familiar with computer-assisted learning tools, such as multimedia, databases, tutorials and simulations, and sources of documents and distance learning activities, which expand possibilities for self-teaching enormously.

Of course, these tools have to be adapted to the students: there will likely be less use of the Internet in kindergarten than in secondary school.

References

Coulombe, Denis. *Curriculum en TIC.* Commission scolaire des Islets, 1996.
This document discusses the technical mastery of the tools by users. It may be found at the following site:
http://rtsq.grics.qc.ca/saqca/curri/curr_tic.htm

Québec. Ministère de l'Éducation. Direction de la formation générale des adultes. *Microcomputing* program. Québec: 1996.
Although it was written for adults, this program of study can in part meet the needs of young people in general education, until a program is written specifically for the youth sector. The three main objectives of the program are to introduce the students to microcomputers for personal and educational use, to introduce them to an integrated applications suite for use in their studies and in everyday life, and to introduce them to a field of microcomputing as a tool for exploring.

Québec. Ministère de l'Éducation. Direction régionale de la Montérégie. *The Development of New Information and Communications Technologies: 1995-98 Regional Triennial Plan of Action for the Montérégie Region.* Longueuil: 1995.
Code 86-0012A.

THE USE OF COMPUTERS IN REGULAR PROGRAMS OF STUDY

What programs could benefit from NICT? What contribution do NICT make to the various programs? (These are broad questions. See the work being done on these questions in the Montérégie region.)

Individual Needs of Certain Students

Are there students who may need specific equipment because of physical or intellectual disabilities? Are there students who need extra stimulation and who might be especially helped by NICT (dropouts, students from disadvantaged areas, immigrant students with a poor educational background, students with learning difficulties, or students in welcoming classes)?

EDUCATIONAL MANAGEMENT OF COMPUTER RESOURCES

What methods should be used to give students fair access to the computer resources?

In some school boards, the staff may be asked to propose a plan for computer use. Teachers may be encouraged to create joint projects, which will have the advantages of being based on the group's interaction and of being easier to support.

Rules and Ethics

Should ethical standards be imposed on the use of computer techniques in general and of the Internet in particular, for both students and teachers?

Should there be a set of rules for the use of the computer labs?

References

Columbia University Institute for Learning Technologies. *ILTweb: LiveText: Technology Planning* (consulted 9 September 1996): **http://www.ilt.columbia.edu/k12/livetext/resources.html**
This site provides links to 13 sites on planning and 7 sites on ethics, copyright, censorship, and related subjects.

Review of the School's Educational Project

Should a review of the school's educational project be included in the medium-term planning since it could affect the school plan?

Communications Plan

Depending on the size of the school, it may be appropriate to think about a communications plan. The quality of communications during the period when the plan is being prepared and applied should be given some attention. The following are some of the activities of a communications plan:

- gathering information from parents and teachers, using subcommittees, studies, or questionnaires distributed to parents or students at registration;
- distributing written information, including information on the orientations that have been adopted;
- managing the financial resources in an open way;
- defining each person's role (school administrators, education consultants, technical support staff, etc.);
- cooperating with the school board and the region, and harmonizing the use of computers for management and educational purposes;
- reminding all involved that the resources are allotted on the basis of the school plans presented and that working on the plan is an excellent opportunity to think about the integration of NICT.

Have you thought about ongoing evaluation of the project and setting up good channels of communication? This is especially important if there are thousands of students in the school. The following are some of the possible activities:

- concentrating on the users (client-centred approach);
- creating a NICT committee;
- creating a users' committee that can state officially three or four times a year how the process is proceeding;
- publishing a newsletter or a section in the school newsletter;
- reorienting the activities on the basis of feedback gathered regularly.

4.2.3 Short-Term Planning of the Integration of NICT into Teaching and Learning

Planning should be done on an annual basis. The first year will probably be the hardest; at that time, each element of the medium-term plan should be considered and a decision made as to:

- where you can start;
- where you should start.

Some school boards ask their teachers to submit a structured plan for computer use and have even developed a form for them to use.

FIRST YEAR

Where should you start in order to see that all the students in the school have enough time and training to use computers? Introducing NICT into every discipline demands work on the part of the teachers. It is possible to reach all the students without all the teachers having to make the same effort at the same time.

In some cases, it may be appropriate to install computers in the library, with an Internet connection.

In secondary school, you may want to start with a discipline that involves all the students (but not necessarily all the teachers at the beginning), and if there are enough teachers who are interested and motivated, choose two consecutive levels of a program of study (Secondary II and III, for example) and spend two thirds of the teaching time in a computer lab with one computer per student.

In elementary school, the same approach may be used, choosing the cycle that has the best chance of success. A lab with at least 17 work stations is required (with one work station for every two students, plus one or two extra computers in case any are out of order), and in addition, there should be from 3 to 6 computers in a classroom with a teacher who is ready to take part in this experiment.

By proceeding in this way, you can reduce the total work required while providing sufficient resources to support the implementation of NICT in a specific sector. This is the focused

approach. However, there is no reason not to distribute some resources elsewhere as well, in order to avoid finding yourself with only a small group of computer enthusiasts after a few years.

Which of the objectives on NICT should the students attain in the first year?

MAKING CONNECTIONS BETWEEN PROJECTS OR ACTIVITIES AND PROGRAMS OF STUDY

The plan may include the objectives targeted in projects in terms of both the mastery of the technical aspects of NICT and the programs.

Should the specific needs of certain groups of students be accommodated? If so, details should be provided.

INSTRUCTIONAL MATERIAL, EQUIPMENT, AND LEARNING ACTIVITIES

How should you go about setting the objectives the students should attain?

Scenarios for integrating NICT into teaching in several disciplines should be found or designed.

Software and electronic documents (multimedia or Web sites) should be evaluated and selected.

Software should be purchased only after evaluation. Is the supplier willing to do a demonstration? Is an evaluation version available? Is it user-friendly? Do you have access to reliable sources for evaluations of software (for example, the Cemisthèque, about which information is provided below)? How will the software allow you to meet the requirements of the program of study? What software is regularly used in the fields in which you plan to use NICT? What equipment is required, and for how long?

References

Cemisthèque. *Bienvenue à la Cemisthèque* (consulted 9 September 1996):
http://rtsq.grics.qc.ca/cemistheque
This site provides an on-line catalogue of scenarios for using NICT in the classroom in the Québec context.

Commission scolaire catholique de Sherbrooke. *CyberScol* (consulted 10 September 1996):
http://CyberScol.cscs.qc.ca
One of the objectives of CyberScol is to promote the use of the educational resources of the Internet.

Ixemedia. *Ressources éducatives de l'infobourg québécois* (consulted 10 September 1996):
http://www.ixmedia.com/infobourg/

The publisher of a map of Québec educational resources available on the Internet presents its catalogue on-line.

Mataigne, Bernard. *edu@media* (consulted 9 September 1996):
http://edumedia.risq.qc.ca/
This Québec magazine, which provides useful information on NICT, is available only on the Internet.

Québec. Ministère de l'Éducation. Direction des ressources didactiques. *Software evaluated by the ministère de l'Éducation since 1993* (Montréal, 1995).
Although this catalogue is out of print, it has been distributed to all school boards and public and private elementary and secondary schools in Québec. It is also available electronically in the form of a database on the Web:
http://CyberScol.cscs.qc.ca/bd/meq/MEQ.csbd?function=form

Québec English Schools Network. *Math Teaching Resource Centre* (consulted 17 February 1997):
http://www.qesn.meq.gouv.qc.ca

Technology & Learning (consulted 4 September 1996):
http://www.techlearning.com/
This Web site belongs to a magazine devoted to NICT in education, and it offers software evaluations and articles published in the magazine.

Yahoo. *Yahoo! - Education: On-line Teaching and Learning* (consulted 9 September 1996):
http://www.yahoo.com/Education/On_line_Teaching_and_Learning/
This site provides a directory and a search engine that can be used to search the whole field of education on the Internet.

MANAGEMENT OF COMPUTER RESOURCES

The plan may establish the average amount of time of computer use per student for the year.

How will the school organize the distribution of access time to the computer resources? Who will get the computers that are to be upgraded? How should reservations for the computer lab and the library be handled? How can the equipment be used as productively as possible? How to get the most possible use out of it? What system should be used for equipment reservations? Who should have priority?

CALENDAR

The school should decide whether it wants to add deadlines for equipment reservations or submission of projects for using the computers to the school calendar. How can training and support activities be fitted in with the teachers' planning of their teaching time?

4.3 Plan for Providing Teacher Training and Support

4.3.1 Your Vision of Teacher Training and Support

TRAINING MODEL

How much should NICT be integrated into the teachers' work in class preparation, educational management, or teaching? How will integration change the teachers' work?

Does the school or the school board have a professional development plan for the staff? Should this plan be reviewed in the light of the orientations adopted?

It has often been observed that to be effective, training in NICT has to be not only appropriate but also provided "just in time." There is no value in people taking a word processing course six months before they have regular access to a word processor. How can you make sure that the training is effective?

Does the training model you want to use make those involved feel responsible for the development of their professional skills? What is their share of responsibility?

In some schools, the teachers are asked to design small projects involving more specific training directly related to the needs.

References

Paquette, Claude, Paul Francoeur, and Jacques Desautels. *Jalons d'une école pour tous, Synthèse de la vision dégagée par les groupes de travail de la Mission 95.* Longueuil: ministère de l'Éducation, 1996.
This document presents a vision of education in the future and proposes long-term objectives. Code 86-0015. An English translation will be available (code 86-0015A).

USER SUPPORT MODEL

What kind of training and technical support should be provided for teachers?

Analysis of the technical problems teachers encounter shows that more than half of them can be resolved by means of advice from colleagues (or sometimes even from students). Similarly, inexperienced students can get help from those who are more expert; if this help is structured even slightly, the need for help by teachers can be substantially reduced. Many educational organizations have been able to exploit the school's most abundant resource: teachers and students. Besides, it is not realistic to envision having a support team of experts in every school.

Students (who are members of a computer club, for example, or have taken the Introduction to Computer Science course which has been redesigned for the purpose) can help their peers and at the same time develop their ability to form helping relationships, thus making things a great deal easier for teachers having to deal with 15 or more teams demanding their attention at the same time.
One school board has decided to reorganize the content of the Introduction to Computer Science course to train the students to provide technical help to NICT users. In doing so, it is investing in a resource that will not decrease in value: the students.

Other school boards have adopted the innovative model of the teacher as resource person, the person who can give you an answer quickly when you meet in the hall or at lunch. The advantage of such a person is that he or she is very close to the other teachers. In addition, a school board that wants to use this model on a broad basis can provide regular support from an education consultant for these teachers who are themselves providing support to NICT users.

ROLES AND SKILLS OF TEACHERS USING NICT

It should be possible, on the basis of your vision of the use of NICT in teaching, to define the roles of the teachers and the skills they should have mastered.

Should the teacher's role be that of guide or of holder of knowledge? What should be the role of the administration? How will the job of the specialists be changed? What should they know and what skills should they possess?

4.3.2 Medium-Term Planning for Providing Teacher Training and Support

A plan should identify the needs and define the style of training. Training should be planned in three stages:
1. mastery of the hardware and software to become a regular user
2. assimilation of the pedagogical dimension integrating NICT into teaching and learning
3. user support by colleagues on a daily basis during the first two steps in addition to contributions by specialists; each person helps and is helped by others.

CONTENT OF THE TRAINING AND SKILLS TO BE ACQUIRED

What skills in NICT do teachers need to carry out educational management and teaching, and to teach NICT? Can the skills required be described? Are there some techniques that everyone should master, and others that only some teachers need? How should the content be divided up in terms of time and in terms of the various groups of teachers?

The extent to which the teachers should master NICT should probably be established. A priori, it seems clear that, if the

general, horizontal approach is used, the staff should master a good part of what the students are expected to master. As guidelines, the objectives that have been set for the students could be copied here, possibly with some adaptation.

The Computer as a Teaching Tool

But should you not go farther than mastering the technology? For example, the following elements, listed in order of increasing difficulty or unfamiliarity, should be considered:

- the use of computers in educational management: calculation of marks, writing of course notes, production of transparencies;
- preparation of presentations and demonstrations;
- access to documents (e.g. through the Internet) or distance education projects that extend the classroom and go beyond textbooks, for both teachers and students;
- the virtual school (access to the school from the home computer).

It is a good idea to plan activities and develop teaching methods using NICT and, more broadly, to plan the integration of NICT as tools into the various programs.

Using the categories of the Société québécoise de développement de la main-d'oeuvre (SQDM), two distinct training plans may be developed.

A **global training plan** is a series of activities whose purpose is to consolidate or develop the skills of the entire teaching staff; it involves activities that focus on the objectives of implementing NICT in the school, for example, activities related to mastery of the technology or of search techniques on the Internet for all staff members who have anything to do with teaching. However, it is useless to give four sessions on a subject (or the same introduction to word processing four times) in three years to a teacher who still has no access to the technology either at school or at home.

Next, an **adapted training plan** should be developed, specifying activities to upgrade or consolidate the skills of one or more teachers. For example, a plan may be developed for all the preschool education teachers. Such a plan would include activities such as a demonstration by a teacher of how to use drawing software with five-year-olds. Another example might involve Secondary Cycle Two teachers learning how to do systematic searches on the Internet for information to integrate into their teaching.

References

Société québécoise de développement de la main-d'oeuvre. *Guide 1996 : loi favorisant le développement de la formation de la main-d'oeuvre.* 1996.
Developed for use in on-the-job training, this guide contains tools that are useful in planning, organizing, and evaluating the training. It may be obtained from the regional offices of

the SQDM. Document code: SQ-0245 (96-03). The addresses of the regional offices may be found at the SQDM Web site:
http://www.gouv.qc.ca/sqdm

Stimulation and Motivation Plan

There is no learning without a clear perception of self-interest in learning.

What kind of stimulation and encouragement should you plan to give the teachers who become involved in this process? What do you plan to do to maintain their motivation and recognize their achievements? What resources can be allotted to this?

Would it be a good idea to set up a program—or revive or modify an existing program—to encourage teachers to acquire computers?

Mastery of computer equipment depends on training and even more on use. Having a computer at home can encourage teachers to become familiar with NICT. Generally speaking, the more time is spent using NICT, the faster they are mastered.

Some educational institutions offer a limited number of interest-free loans for two or three years to anyone on their staff; these loans can be reimbursed through payroll deductions at source. The institution may even offer advice on what type of computer to buy.

Other educational institutions have loaned computers to members of their staff for a one-year period for home use. Another possibility would be that the school loan computers to certain staff members for a six-month period.

References

Coulombe, Denis. *Curriculum en TIC.* Commission scolaire des Islets, 1996.
This document discusses the technical mastery of the tools by users. It may be found at the following site:
http://rtsq.grics.qc.ca/saqca/curri/curr_tic.htm

Québec. Ministère de l'Éducation. Direction de la formation générale des adultes. *Microcomputing* program. Québec: 1996.
Although it was written for adults, this program of study can in part meet the needs of young people in general education, until a program is written specifically for the youth sector. The three main objectives of the program are to introduce the students to microcomputers for personal and educational use, to introduce them to an integrated applications suite for use in their studies and in everyday life, and to introduce them to a field of microcomputing as a tool for exploring.

USER SUPPORT PLAN

What means should be used to meet the teachers' almost daily need for support? What form can educational support take in a context where this is increasingly becoming the school's

responsibility yet resources are shrinking? How can adequate support be provided?

It is obvious that it will take a year before a microcomputer club can be expected to function, and the same is true for the modified Introduction to Computer Science course. The resource-teachers will not spontaneously become experts; they will have to develop their expertise. What do you plan to do while waiting for these solutions to become operative? Could the teachers receive support from colleagues and specialists outside your school by means of the Internet?

It is not feasible to wait for the existing staff to be trained and then to ask them to apply what they have learned (but you could require that new teachers that are hired have a solid mastery of NICT). Furthermore, it is not easy for teachers to find time to train themselves. It necessarily follows, then, that some of the teachers will have to start working with students before they have fully mastered the environment and will thus have to do the necessary learning "just in time." For this to occur, the teachers and students need to have support available almost immediately; the presence of a technician once a week or an education consultant once a term is not sufficient. What other possibilities can you envision?

What will you do to see that the staff all understand Canadian copyright law with respect to schools?

Have you considered the possibility of calling on outside help at the beginning? What can you do to see that this help is provided "just in time" and in accordance with the principle of having the learner take responsibility for the learning?

4.3.3 Short-Term Planning for Providing Teacher Training and Support

TRAINING ACTIVITIES

How should you begin the training of the teachers? What method will ensure the dissemination of the skills?

Would it be a good idea to do surveys to identify the teachers' training needs and, later, to determine what they have retained in the medium term?

What training activities will be offered, and how will they be offered?

References

The Association québécoise des utilisateurs de l'ordinateur au primaire et au secondaire (AQUOPS) offers made-to-order training sessions. See the September 1996 issue of *Le Bus* and contact Terri Verret, Director, AQUOPS: e-mail: terri.verret@aquops.qc.ca; telephone: (514) 948-1234; fax: (514) 948-1231.

Calendar

The plan should state the dates of the main stages of implementation, taking into account the school calendar and the teachers' days of availability. Lesson planning should be coordinated with the training for the "just in time" principle to be effective.

USER SUPPORT ACTIVITIES

In what form will you provide immediate help that the teachers can count on when something does not work or they do not understand something (this does not mean equipment maintenance)?

HUMAN RESOURCES

What human resources can be used to provide training and support?

Have you considered the possibility of calling on outside help at the beginning? What can you do to see that this help is provided "just in time" and in accordance with the principle of having the learner take responsibility for the learning?

Have you taken inventory of the resources available within and outside the school?

The following resources may be available in your community:

- An expert could work part-time with a group of teachers for a few weeks, helping them solve technical problems, training them to use the software, providing support to students, and helping plan activities for the students.

- Resource-teachers could provide support for NICT as part of their responsibilities.

- Education students who possess computer skills can play an important role, and they enjoy the opportunity to become familiar with their future work.

- Students who have computer skills can form a microcomputer club whose objectives could include providing support to other students and to teachers.
- Students who take the Introduction to Computer Science course could be the school's support providers for NICT; this would require that the content of the course be modified.

- Members of the teaching and administrative staff with computer skills could provide support.

- Seniors and parents could provide support (did you know the average age in microcomputer clubs in the U.S. is over 50?).

- Animators from the CEMIS for your board or region could be asked to provide support.

- Education consultants could be used to provide support.
- Post-secondary students could provide support as part of a work-study arrangement.
- Municipal libraries serving populations of fewer than 10 000 persons may have subsidies to allow them to have access to the Internet.
- Private consultants could be used (see *La Toile du Québec* Web site for a list).

References

CEMIS. Home page (consulted 9 September 1996):
http://grics.grics.qc.ca/cemis/
The CEMIS exist to serve schools and school boards and to help them prepare their school plans.

Netday. *Netday96* (consulted 10 September 1996):
http://www.netday96.com/
Netday is an American organization whose objective is to have all the schools in the U.S. connected to the Internet.

La Toile du Québec. *Travailleurs autonomes* (consulted 15 October 1996):
http://www.toile.qc.ca/travailleurs_autonomes/
This page has a list of private consultants, who put their own names on the list.

EVALUATION

How do you plan to evaluate whether the objectives you have set yourself have been attained—not only in terms of whether the staff liked the training, but whether there have been observable changes in the teaching? How do you plan to communicate this information to those interested (students, parents, school board)?

4.4 Technology Implementation

The members of the committee responsible for preparing the school plan should be given access to any information they feel they need to make informed decisions. The Internet can be a very valuable asset in the process, because it offers a great deal of information on technology and education.

Given the reductions in public spending, it is wise not to depend on resources that may disappear. You should therefore look at how the solutions you are considering will withstand the budget cuts that are foreseeable in the future.

4.4.1 Your Vision of Technology Implementation

How will you be able to continue increasing the number of computers in the school, developing networks, buying new software, and upgrading the existing computers and their software when financial and human resources are decreasing? Some people say that in the very near future every student will have a laptop computer, and that the school will no longer be the sole provider of technological resources. The school would still have to provide a network that the students could connect to from within the school or from home. The school's main role as technological provider would then be to offer a very fast, powerful network.

Does your school subscribe to this view? If not, how do you see future developments?

4.4.2 Medium-Term Planning of Technology Implementation

Given the existing pedagogical needs, what should your choices be in terms of technology for the coming three to five years?

You can only make definite choices after designing your program and determining the main software you plan to use.

In addition, since the technology is in constant evolution, you should think about the upgrading possibilities of memory, processors, networks, and other equipment. It may be wise *not* to buy everything at once. This allows you not only to spread your spending out over several years but also to always have some very advanced computers for use with more demanding applications. If the staff of your school is not very familiar with NICT, purchasing large numbers of microcomputers before they have even been trained can lead to a lot of equipment becoming obsolete and getting scrapped before people even know how to use it.

COMPUTER PURCHASING PLAN

How should equipment purchasing be distributed over three to five years? How will the internal network be developed? What

connections do you plan to have to the Internet? What is your pedagogical plan, and how does it determine the equipment purchasing?

What functions and what possibilities should the computers offer, given the software you plan to use on them? How user-friendly is the equipment?

You should expect to have to renew much of the equipment in three to five years, and thus plan to use the newest and most powerful equipment for the most demanding applications, and the less powerful equipment for other functions.

Would it be a good idea to set up a group buying program for the staff as well as the school? See Cadieux, below.

References

Cadieux, Pierre-B. *Un programme d'achat regroupé.* Montréal: EICEM, 1996.
To obtain this document, see École informatisée Clés en main, in section 6, the bibliography.

United Computer Exchange. *United Computer Exchange Corporation* (consulted 10 September 1996):
http://www.uce.com/
This site provides a price list for used computer equipment and a list of dealers.

Detailed evaluations of new equipment on the market are provided in specialized publications. Better still, many articles from these publications may be found on the Internet. As they are indexed, you do not need to know the titles of the publications; you simply need to do a key word search using a search engine. Two sites are particularly useful:
http://www.zdnet.com/cgi-bin/taos_paint.pl
This site lets you search back issues of the computer magazines published by Ziff-Davis: *MacUser, MacWeek, PC Magazine, PC Week, PC Computing, Computer Shopper,* etc.
http://www.macworld.com/password/static/search.html
This site offers back issues of the magazine *Macworld.*

Standards

Should you opt for standard solutions in your choice of equipment, protocols, and software? Should you fear being isolated if you choose a platform unique to the world of education? Should variations be allowed, and to what extent? Should standards be imposed? Is it feasible for two platforms to co-exist in a school, especially if each one has different applications? Should not development be variable, adapted to the specific situation? For example, depending on the educational objectives sought, it may be useless or even harmful to use a sophisticated word processing program like MS Word 6 at the

elementary or even secondary level, when integrated software exists that is adequate for students at these levels. To take another example, Macintosh computers still have an advantage in certain areas, such as digital video.

The Nature of the Equipment

What technologies should be included in the plan? CD-ROMs? A server? An internal network? An external network? Tools for group demonstrations? Modems? Projection equipment for use with groups (electronic transparencies, big screen, projector, projection of images from the teacher's monitor onto the student's monitors)? Internet links? Scanners? Networked printers, colour printers, printers for several computers, tracers?

Replacement Computers and Financing of Replacements

How will you replace obsolete equipment in four or five years? What will you do with the obsolete equipment? How will you pay for replacement computers? In the long term, will you not you be aiming to have more and more computers in order to lower the ratio of students or teachers to computers?

NETWORK IMPLEMENTATION PLAN

In the long term, are you aiming to have one computer for every student, for example, a laptop model belonging to the student and equipped to connect to the school network from within the school or from the student's home? At the socio-economic conference on NICT held in January 1996, representatives of the colleges (the Association pour les applications pédagogiques de l'ordinateur au postsecondaire and the Centre collégial de développement de matériel didactique) suggested that in the medium term all college students should have their own laptop computers connected to a network maintained by the college. Other people envisioned the same thing happening in schools as well in the long term. With the needs at the college level continuing to grow, it will clearly be very difficult to provide a computer for every student or to greatly increase the number of computers in addition to providing support to users. Some faculties in American universities are now requiring every student to have a laptop computer, and others have already been doing so for several years.

In the long term, are you aiming to have all students supply their own laptop computers? Should they be able to connect to the school network from within the school? Should they be able to connect to it from home?

One requirement is already evident: the importance of both internal (intranet) and external (Internet) networks. Networks multiply the possibilities of personal computers. Therefore it is important not to skimp on the quality of the infrastructure

of the network you install, because it will have to support the applications of the future. You should consider providing the servers and acquiring the skills necessary. If the future role of the school will be limited to providing reliable and powerful access to internal, local area, regional, and world networks, and will not include providing computers for the students, it is important to ensure that the network set up is of high quality and that it can provide good service for ten years.

Technological change has accelerated in recent years. Can this rate of change be expected to keep up? What are its consequences for education?

How can the importance of the networks the students can connect to be described?

If you want to have an Internet link for most of the computers in the school, would it not make sense to first set up an intranet (a local network that uses the Internet's software, norms, and protocols)?

Would it be appropriate to set up a regional network before connecting to the Internet?

Should you set up a local area network first and a connection to a regional or world network a little later (in one or two years)?

What bandwidth do you need?

If your plans are very ambitious, perhaps you should consult a specialist in local area network planning?

How do you plan to provide access to data on CD-ROMs?

Do you want to use multimedia on your network?

Do you want to connect the entire local area network to the Internet, or only some computers? Which computers are a priority? Can the network be extended gradually? Where should you start?

Do you want to bring together municipal services such as the public library and educational services such as the school board to provide Internet access to the community and share costs and maintenance?

Multimedia or video may be used in a large part of a local area network. The ALEX technology from Montréal provides multimedia servers able to support this type of application. More costly than traditional servers, they can provide an interesting solution in some cases, for example, language labs. If you do not plan to get this type of service at the outset, perhaps you should still design the architecture of your network in such a way that it can be developed to carry it eventually, such as by putting in cables that can carry 100 megabits.

References

APO Montérégie. *APO Montérégie* (consulted 10 September 1996):
http://ntic.qc.ca/APOMONT/
This site describes the costs involved in an Internet connection for educational purposes if you want to give all students real access, and provides a comparative study of the costs.

Common Knowledge: Pittsburgh. *Common Knowledge: Pittsburgh* (consulted 9 September 1996):
http://info.ckp.edu/
At this site, the University of Pittsburgh and the Pittsburgh public schools (which are equivalent to a school board here) provide in a variety of formats technical articles on research projects and results, proposed standards for designing a network in a school, educational material, and other information.

Consortium for School Networking. *Technology Planning Guide* (consulted 10 September 1996):
http://cosn.org/techguide.html
This site provides an on-line planning guide and a variety of American guides and plans.

Netday. *Netday96* (consulted 10 September 1996):
http://www.netday96.com/
Netday is an American organization whose objective is to have all the schools in the U.S. connected to the Internet.

DISTRIBUTION OF THE TECHNOLOGY IN THE SCHOOL

How can you use the equipment in the most productive way? How can the computer labs be made accessible after school and at recess? How can you guard against theft and damage to the equipment in a context of freedom of access?

Should computers be put in the school library? Is the library a major source of information used by large numbers of students?

Where should the computers used for educational administration and management be put?

Should the computers be put in classrooms or labs or both?

Advantages and Disadvantages of Putting Computers in Classrooms versus Labs

When there are between three and six computers in the classroom, they can easily be integrated into class activities, becoming a useful resource on a permanent basis as they are in an office. But in order for this to occur, teachers must develop more flexible class management methods, with not all of the students doing the same thing at the same time. Older computers can be put to good use in the classroom. Here as elsewhere, you should carefully assess the number required for what you plan to do.

Some people say that computers tend to be used less when they are in the classroom than when they are grouped together in a lab where the students go to learn to master the technology. In addition, if the labs are accessible outside of regular school hours, an atmosphere of mutual help can develop which may be very valuable.

In elementary school, depending on the space available, computers may be set up either in classrooms or in labs; the lower the level, the better it is to put the computers in the classroom. In secondary school, the lab format tends to be necessary because the students and teachers change rooms regularly.

As a general rule, there should be one computer per student when activities are planned for a class, even if the class has to be divided into two groups (which causes other problems). This is essential for some activities, for example, when the students have to produce individual work (in art or language arts). In some instances, two students can share a computer; this is often sufficient for team assignments such as a chemistry lab report.

How many computers will you put in classrooms and how many in labs, taking into account the numbers of students and the availability of technical support persons?

Desirable Characteristics of a Lab Set-up

If you opt for a laboratory set-up, how can you ensure that the teacher is able to control what the students see on their screens?

Will it be possible for the teacher to address the whole class at once with the appropriate display equipment, especially in the lab but in the classroom as well? Would it be possible to have a portable projector?

In a school, computer users often change computers, but they want the work environment to be the same from one computer to another; the operating systems of microcomputers have not been designed for this: as their name indicates, they are *personal* computers. How can you ensure a consistent working environment while allowing for adaptation? One example of a desirable type of adaptability is the ability to send personal e-mail from any computer. But since the address of the sender of a message is registered in the configuration of the electronic mail software, how can it "follow" the user from one computer to another?

TECHNICAL SUPPORT PLAN

The plan can describe the technical support required for the design, installation, and initial use of the network, and any adjustments that may be necessary in the course of its use, identifying the strictly technical problems that may arise, problems that are related not to ignorance of NICT but rather to mechanical failure or software maintenance.

What kind of technical support will be provided for any repairs that are needed and for preventive maintenance? Can you expect organized technical support from the school board? Should you plan for regular upgrading of software? Should you deal with a private company for installation and technical support?

The following are suggestions concerning maintenance:

- Include regular cleaning of the equipment (especially mice and printers) in the job description of the school maintenance staff or hire students to do it.
- Make sure you have a budget for repairs.
- Train the school staff to make common repairs.
- Ask reliable persons to provide some of the maintenance for free or at a reduced price.
- Plan the installation of the computers in such a way as to simplify maintenance.
- Make sure that the purchase contract for the equipment includes a good guarantee (at least one year, parts and labour).
- Create a small database to keep track of repairs and record everything done to the computers.
- Check the equipment regularly to prevent problems.
- Provide two extra computers in the labs to ensure that even if there is a failure, there will still be enough usable computers.
- See that any repairs are carried out in the shortest time possible; equipment that cannot be used is a source of frustration for teachers and can lead to a rejection of the technology on their part.

SECURITY PLAN

The more computers there are in the school, the more easily you can access information and the more information you can access—and the more urgently the question of security arises. Will your systems be protected against users who are ignorant or even want to deliberately cause harm? It is possible to install a system that prevents users from modifying the installation of software and ensures the stability of the environment. Do you plan to have this kind of system? What measures can you take to prevent theft?

The following are suggestions concerning security:

- Has a budget been allocated for security?

- If you are planning to install a network server, how much security will you need for it?
- Will the users have passwords? You will still want to keep the procedures for gaining access simple.
- Do you need an alarm system for protection against theft?
- Have you considered installing a surveillance camera?
- Will there be a procedure for regularly saving data? Will back-up copies of certain essential data be stored in a separate place from the computers? The ideal place would be somewhere outside the school.
- Have you planned to keep all program diskettes and documentation in one place, such as a special section of the library?
- There are programs that allow you to automatically reconstruct anything that has been modified on a hard disk: for Macintosh computers, Assimilator (a shareware program available through the Internet) or AtEase for Workgroups 3.0, from Apple. With PCs, it is possible to remove the hard disk and use software from the network server.
- Should measures be taken to prevent the students from accessing material reserved for adults?

4.4.3 Short-Term Technology Implementation Plan

EQUIPMENT PURCHASING AND MANAGEMENT

What proportion of your medium-term purchasing plan do you intend to carry out this year? What equipment will you buy, and for what reasons?

Should you plan a system for replacing the computers in which persons who receive new computers pass theirs on to other persons, who in turn pass theirs to others?

Do some of the existing computers need to be upgraded? Should some be scrapped?

Implementation of the Network

What proportion of your medium-term plan to develop your network do you intend to carry out this year? Should you make a network plan? What type of network is involved: local area, external, school board, the Internet? What is the capacity of the local area network? Are modifications to the existing network required? Do some servers need to be upgraded or replaced; are new servers needed?

Calendar

The plan should determine the dates for the main steps in installation, taking into account the school calendar and the availability of rooms.

DISTRIBUTION OF THE TECHNOLOGY IN THE SCHOOL

How do you plan to distribute the technology this year: classrooms, labs, library, teachers? Should this part of the medium-term plan be modified?

TECHNICAL SUPPORT

What resources do you plan to allocate for technical support this year?

Should you rely on subcontracting or use the school board's resources to install the computers or the cabling? To configure and install the software? To do maintenance and any repairs that are necessary? (Direct support to users is dealt with in section 4.3, "Plan for Providing Teacher Training and Support.")

SECURITY

What security equipment do you plan to install or to improve this year?

EVALUATION

At the end of the year, you should look at whether the technology plan for the year was followed, and if it was not, why not. Does it need to be modified or should you simply continue following it? In what form will you communicate this evaluation to those interested (students, parents, school board)?

4.5 BUDGET

Can you estimate the cost per student, per work station, or even per hour per work station? These figures will allow you to easily compare projects.

4.5.1 BUDGET RELATED TO TEACHING AND LEARNING

BUDGETARY ALLOCATIONS FOR THE YEAR

Expenditures in this category should be established for the current year.

BUDGETARY FORECASTS FOR THREE YEARS

This section should cover the cost of purchasing or designing computerized instructional materials, developing databases, designing pedagogical scenarios, and subscribing to telematic services (Internet, bulletin boards, specific services such as directories of magazines or newspapers, etc.). What is the cost per student?

4.5.2 BUDGET FOR TRAINING AND SUPPORT

BUDGETARY ALLOCATIONS FOR THE YEAR

Expenditures in this category should be established for the current year.

BUDGETARY FORECASTS FOR THREE YEARS

This section should cover the immediate cost of training and support for the current year as well as other costs related to training, such as purchasing printed and electronic documentation and replacement of teachers.

4.5.3 BUDGET RELATED TO THE ACQUISITION OF SUBSIDIZED EQUIPMENT

Only expenditures that are admissible for the shared-costs program should be included, and not expenditures such as those for technical support or an alarm system.

BUDGETARY ALLOCATIONS FOR THE YEAR

This should be the cost for the equipment buying plan (Ministère and school board shares).

BUDGETARY FORECASTS FOR THREE YEARS

You should make a three-year buying plan related to the overall plan.

4.5.4 Budget for Non-subsidized Equipment

BUDGETARY ALLOCATIONS FOR THE YEAR

Expenditures should be established for the current year for furniture, electrical installations, repairs, technical support, an alarm system, and so on.

BUDGETARY FORECASTS FOR THREE YEARS

Expenditures should be established for three years.

5. Responsibilities of the School Board

5.1 Strategic Choices

The division of powers and responsibilities between schools and school boards varies from area to area. The strategic choices made by the school board can thus have different effects on the preparation of a school plan.

It is up to the school board to determine the terms and conditions of the distribution of the budget for equipment among its schools, depending on local choices concerning concentration, sharing, the ratio, the calendar for implementation, and other questions. Some school boards have made a list of the schools that are most active in NICT, and they contribute more to those schools that invest more money per student. The school's investment per student is an excellent indicator of how active it is in this area. There are schools that object to this method on the grounds that it will increase the gap between schools in disadvantaged and advantaged areas.

The school board can also establish orientations in the following areas:

- the educational use of NICT;
- the model for the gradual integration of NICT into the school;
- computerized instructional materials;
- standards for the equipment, the local area network, connections to the information highway, group purchasing of software and equipment, etc.;
- harmonization of management information and educational management systems;
- technical support;
- user support;
- educational support;
- staff development;
- professional development for the school administrators;
- staff duties;
- mastery of NICT and related educational applications as hiring criteria (the Des Découvreurs school board adopted such a policy and has a document describing it; other school boards are in the process of making this a criterion for hiring);
- measures to encourage the staff to become familiar with NICT.

This being said, should there not be variations within the same school or school board? Must there be a single solution for everyone? Should you not avoid putting all your eggs in one basket, while still respecting existing standards? Have you

considered the fact that needs can vary? Are the solutions you have adopted flexible?

5.2 Consolidation of School Plans

Once the school board has evaluated the school plans submitted to it by the schools in its territory, it consolidates them with its own master plan. The resulting synthesis is sent to the regional office of the Ministère.

Generally speaking, the consolidation of the school plans may include the following:

1. the number and names of the schools whose plans have been incorporated in the consolidation, and a summary of each of their school plans

2. an outline of the strategic choices made by the school board (specifically, with respect to the pedagogical project and the training and support provided to teachers)

3. a description of the technical support planned (education consultant, technician, or specialist): the number of hours of support per teacher per year deemed desirable, structures planned to help the staff familiarize themselves with the technical aspects of NICT (e.g. mutual support among the teachers, use of resource-teachers, forming structured groups of students to provide support, using volunteer parents)

4. a list of the methods chosen to train staff and the number of days of training planned per teacher

5. an inventory of the school's current computer equipment and a description of the equipment you plan to have: number of computers; ratio of students to computers (before and after the planned purchases); average age of the existing computers (before and after the planned purchases); proportion of computers that are obsolete; number of computers connected in a local area network, linked to a regional server, or connected to the Internet (if applicable); number of schools in a network with the school board, if any

6. a description of the heavy technical support planned (not user support, but equipment repair): number of technicians planned, means of providing technical support (e.g. specialized staff, volunteer parents, specially trained students)

7. where appropriate, participation by the school board or certain schools in experimental or research activities

8. details of the projected budget: distribution of the sums according to the framework established (the respective shares of the Ministère, the school board, and the school),

resources allotted to staff development and acquisition of equipment and instructional materials

This consolidation should be carried out annually and should be part of the application for funding sent to the Ministère.

Starting in 1997-98, school boards will have to provide a detailed report on the preceding year's achievements and an evaluation of the objectives sought in the various school plans.

In addition, every year the school board will have to prepare a report showing that it has done its fair share with respect to the funding provided by the Ministère.

6. BIBLIOGRAPHY

6.1 DOCUMENTS CONSULTED

Apple. *Teaching, Learning & Technology—A Planning Guide.* Cupertino: Apple, 1995.
This self-teaching tool shows how to plan NICT.

Basque, Josiane. *Strategies for Integrating Information and Communication Technologies into Schools (Thirty Recommendations).* Montréal: EICEM, 1996.

Cadieux, Pierre-B. *Un programme d'achat regroupé.* Montréal: EICEM, 1996.
To obtain this document, see École informatisée Clés en main.

Centrale de l'enseignement du Québec. *Les autoroutes de l'information : enjeux et perspectives,* notes de recherche, no. 35.
This document may be obtained for $3 from the CEQ documentation centre, (418) 627-8888. Code D10304. It will also be available on the CEQ Web site:
http://ceq.qc.ca

Centrale de l'enseignement du Québec. *Il ne suffit pas d'être branchés,* reference document on NICT in education.
This document may be obtained for $3 from the CEQ documentation centre, (418) 627-8888. Code D10313. It will also be available on the CEQ Web site:
http://ceq.qc.ca

Centrale de l'enseignement du Québec. *Les inforoutes et la société du savoir : nouveau défi pour le monde de l'enseignement,* notes de recherche, no. 34.
This document may be obtained for $3 from the CEQ documentation centre, (418) 627-8888. Code D10246. It will also be available on the CEQ Web site:
http://ceq.qc.ca

Conseil supérieur de l'éducation. *Rapport annuel sur l'état et les besoins de l'éducation du Conseil supérieur de l'éducation— Les nouvelles technologies de l'information et de la communication : des engagements pressants.* Montréal: 1994.

Coulombe, Denis. *Curriculum en TIC.* Commission scolaire des Islets, 1996.
This document discusses the technical mastery of the tools by users. It may be found at the following site:
http://rtsq.grics.qc.ca/saqca/curri/curr_tic.htm

École informatisée Clés en main (EICEM). This non-profit corporation publishes an impressive collection of documents that

are helpful in planning the implementation of NICT. Documents in the *Computerizing the School* collection (volume 1) may be obtained by becoming an associate member of this organization. Telephone: (514) 251-3891. Fax: (514) 251-3920.

Guidotti, Johanne. *Introducing a Plan for Integrating Information and Communication Technologies into the School.* Montréal: EICEM, 1997.
This publication is a tool for planning the integration of NICT into teaching and learning. To order it, see École informatisée Clés en main.

Paquette, Claude, Paul Francoeur, and Jacques Desautels. *Jalons d'une école pour tous, Synthèse de la vision dégagée par les groupes de travail de la Mission 95.* Longueuil: ministère de l'Éducation, 1996.
This document presents a vision of education in the future and proposes long-term objectives. Code 86-0015. An English translation will be available (code 86-0015A).

Québec. Ministère de l'Éducation. Direction de la formation générale des adultes. *Microcomputing* program. Québec: 1996.
Although it was written for adults, this program can in part meet the needs of young people in general education, until a program is written specifically for the youth sector. The three main objectives of the program are to introduce the students to microcomputers for personal and educational use, to introduce them to an integrated applications suite for use in their studies and in everyday life, and to introduce them to a field of microcomputing as a tool for exploring.

Québec. Ministère de l'Éducation. Direction des ressources didactiques. *Catalogue des logiciels éducatifs évalués.* Montréal: 1995.
Although this catalogue is out of print, it has been distributed to all school boards and public and private elementary and secondary schools in Québec. It is also available electronically in the form of a database on the Web:
http://CyberScol.cscs.qc.ca/bd/meq/MEQ.csbd?function=form

Québec. Ministère de l'Éducation. Direction régionale de la Montérégie. *The Development of New Information and Communications Technologies: 1995-98 Regional Triennial Plan of Action for the Montérégie Region.* Longueuil: 1995.
Code 86-0012A.

Rocheleau, Johanne. *Guide to Writing Implementation Plans.* Montréal: EICEM, 1997. Part of the *Computerizing the School* collection. To order it, see École informatisée Clés en main.

Roy, Robert. *L'Internet à l'école.* Montréal: Guérin, 1996.
This book describes how to access information sources; it is not a guide to Web browsers.

Société québécoise de développement de la main-d'oeuvre. *Guide 1996 : loi favorisant le développement de la formation de la main-d'oeuvre.* 1996.

Developed for use in on-the-job training, this guide contains tools that are useful in planning, organizing, and evaluating the training. It may be obtained from the regional offices of the SQDM. Document code: SQ-0245 (96-03). The addresses of the regional offices may be found at the SQDM Web site:
http://www.gouv.qc.ca/sqdm

6.2 World Wide Web Addresses Useful in Planning for NICT

The links listed below may be found on the page on the school plan at the Direction des ressources didactiques Web site:
http://www.eduq.risq.net/DRD/planific/intro.htm
Anderson, Larry. *National Center for Technology Planning* (consulted 9 September 1996):
http://www2.msstate.edu/~lsa1/nctp/
This site provides access to American resources on the subject, including a planning guide.

APO Montérégie. *APO Montérégie* (consulted 10 September 1996):
http://ntic.qc.ca/APOMONT/
This site describes the costs involved in an Internet connection for educational purposes if you want to give all students real access, and provides a comparative study of the costs.

Association pour les applications pédagogiques de l'ordinateur au post-secondaire. *Mémoire de l'APOP aux États généraux de l'éducation* (*Clic,* vol. 1, no. 1, 1995) (consulted 10 September 1996):
http://www.vitrine.collegebdeb.qc.ca/Clic/CLIC1/Memoire.htm

Association québécoise des utilisateurs de l'ordinateur au primaire et au secondaire (AQUOPS) (consulted 9 September 1996):
http://aquops.educ.infinit.net/formation

CEMIS. Home page (consulted 9 September 1996):
http://grics.grics.qc.ca/cemis/
The CEMIS exist to serve schools and school boards and to help them prepare their school plans.

Cemisthèque. *Bienvenue à la Cemisthèque* (consulted 9 September 1996):
http://rtsq.grics.qc.ca/cemistheque
This site provides an on-line catalogue of scenarios for using NICT in the classroom in the Québec context.

Columbia University Institute for Learning Technologies. *ILTweb: LiveText: Technology Planning* (consulted 9 September 1996):
http://www.ilt.columbia.edu/k12/livetext/resources.html
This site provides links to 13 sites on planning and 7 sites on ethics, copyright, censorship, and related subjects.

Commission des écoles catholiques de Montréal. *The CECM's Institutional Project* (consulted 17 February 1997):
http://www.cecm.qc.ca/anglais/institutional_project.html

The school board with the largest number of students in Québec presents its strategic choices.

Commission scolaire catholique de Sherbrooke. *CyberScol* (consulted 10 September 1996):
http://CyberScol.cscs.qc.ca
One of the objectives of CyberScol is to promote the use of the educational resources of the Internet.

Common Knowledge: Pittsburgh. *Common Knowledge: Pittsburgh* (consulted 9 September 1996):
http://info.ckp.edu/
At this site, the University of Pittsburgh and the Pittsburgh public schools (which are equivalent to a school board here) provide in a variety of formats technical articles on research projects and results, proposed standards for designing a network in a school, educational material, and other information.

Conférence socio-économique sur les nouvelles technologies de l'information et des communications en éducation. *Les consensus et les engagements* (consulted 9 September 1996):
http://www.gouv.qc.ca/français/minorg/medu/con_soec/synthese.htm
This conference on NICT and education was held in January 1996 in Québec City. The shared points of view and the commitments of the groups in attendance are helpful for defining a vision of NICT in education.

Conférence socio-économique sur les nouvelles technologies de l'information et des communications en éducation. *Partenaires de demain - État de situation* (consulted 10 September 1996):
http://www.gouv.qc.ca/français/minorg/medu/con_soec/intermed.htm
This site provides a text on the situation of NICT in Québec in January 1996, at the time of this conference, which was followed by the announcement of the Ministère's five-year plan of action. The report published by the Ministère is provided in HTML and can be read on-line using a browser such as Netscape.

Conseil de la science et de la technologie du Québec. *Banking on Knowledge - Status Report 1994, Section 2, New Information Technologies* (consulted 9 September 1996):
http://www.cst.gouv.qc.ca/cst_publ.html
This page provides an English summary of the original document in French, which is also available.

Consortium for School Networking. *Technology Planning Guide* (consulted 10 September 1996):
http://cosn.org/techguide.html
This site provides an on-line planning guide and a variety of American guides and plans.

École informatisée Clés en main (EICEM). *École informatisée Clés en main* (consulted 3 October 1996):
http://www.grics.qc.ca/cles_en_main/
This non-profit corporation is carrying out two pilot projects, which are described on the site. There are also links and documents that are helpful in preparing a school plan.

Ixemedia. *Ressources éducatives de l'infobourg québécois* (consulted 9 September 1996):
http://www.ixmedia.com/infobourg/
The publisher of a map of Québec educational resources available on the Internet presents its catalogue on-line.

Massachusetts Software Council. *The Switched-On Classroom*™ (consulted 10 September 1996):
http://www.swcouncil.org/switch2.html
This is an on-line planning guide for integrating NICT into the classroom, in 12 steps and 250 pages. It contains analysis and suggestions as well as other resources and case studies.

Mataigne, Bernard. *edu@média* (consulted 9 September 1996):
http://edumedia.risq.qc.ca/
This Québec magazine is available only on the Internet. It provides information on NICT in education.

Netday. *Netday96* (consulted 10 September 1996):
http://www.netday96.com/
Netday is an American organization whose objective is to have all the schools in the U.S. connected to the Internet.

New Brunswick. *Report on the Information Highway* (consulted 20 February 1997):
http://degaulle.hil.unb.ca/NB/info_highway/fconts.html
This page presents New Brunswick's plan for the information highway.

Nielsen. *Nielsen Media Research—Interactive Services* (consulted 11 September 1996):
http://www.nielsenmedia.com/news/hotech-summary.html
This site provides Nielsen's survey of the use of technologies in the U.S.

Nielsen and CommerceNet. *Nielsen Media Research—Interactive Services* (consulted 11 September 1996):
http://www.nielsenmedia.com/commercenet/exec.html
This site provides a survey by Nielsen and CommerceNet that compares Internet use in August 1995 and March 1996, in Canada and the U.S.

Ontario. Information Technology Directions Committee. *Information Technology Strategic Planning and Directions* (consulted 10 September 1996):
http://www.ccinet.ab.ca/city-of-gp/it_p_ont.htm

Québec. Commission for the Estates General on Education. *The State of Education in Québec* (consulted 10 February 1997):
http://www.uquebec.ca/menu/
This site provides the main publications of the Commission: description of the current situation, highlights, summary of regional conferences, information documents (folders, list of Commission members, calendar, mandate, etc.), press releases (agendas, calendar, etc.), summaries of more than one thousand briefs, and more than 350 briefs for which it received computer files.

Québec. *La ministre de l'éducation dévoile son plan d'intervention sur l'utilisation des nouvelles technologies de l'information et de la communication à l'école* (consulted 10 February 1997). Press release, 27 June 1996:
http://www.gouv.qc.ca/cpress/c960626.htm
The full text of the plan is also available:
http://www.meq.gouv.qc.ca/nti_plan/plan_nti.htm
This plan was announced by Minister Pauline Marois on 26 June 1996 at the INET 96 conference in Montréal.

Québec. Ministère de l'Éducation. *Ministère de l'Éducation : page d'accueil* (consulted 8 October 1996):
http://www.gouv.qc.ca/francais/minorg/medu_intro.html
This site provides official documents (laws, regulations, and press releases) and statistics, information on financial aid, material on NICT, and links to education resources within and outside Québec.

Québec. Ministère de l'Éducation. Direction des ressources didactiques. *DRD - Menu principal* (consulted 10 September 1996):
http://www.eduq.risq.net/DRD

Secrétariat de l'autoroute de l'information. Comité consultatif sur l'autoroute de l'information. *To Devise a Strategy to Implement the Information Superhighway in Québec. Summary of the Working Paper* (consulted 10 February 1997):
http://www.sai.gouv.qc.ca/sai_pdf/anglais.pdf

Technology & Learning (consulted 4 September 1996):
http://www.techlearning.com/
This Web site belongs to a magazine devoted to NICT in education, and it offers software evaluations and articles published in the magazine.

La Toile du Québec. *Travailleurs autonomes* (consulted 15 October 1996):
http://www.toile.qc.ca/travailleurs_autonomes/
This page has a list of private consultants, who put their own names on the list.

United Computer Exchange. *United Computer Exchange Corporation* (consulted 10 September 1996):
http://www.uce.com/
This site provides a price list for used computer equipment and a list of dealers.

Université Laval. Faculté des Science de l'éducation. *Instituts et réseaux de recherche* (consulted 10 September 1996):
http://www.fse.ulaval.ca/fac/href/data/instit.html
This is a list of links to sites that provide a great deal of information for use in planning.

Yahoo. *Yahoo! - Education: On-line Teaching and Learning* (consulted 9 September 1996):
http://www.yahoo.com/Education/On_line_Teaching_and_Learning/

This site provides a directory and a search engine that can be used to search the whole field of education on the Internet.

6.3 Discussion Groups

plan-ecole@rtsq.grics.qc.ca
This list was created to provide support in the preparation of school plans. It is free of charge, public, and unmoderated. Thus anyone can subscribe to it and post messages and ask questions. To subscribe and receive the messages, send a message through the Internet to the address listed above, saying something like: "Hello! I am X at Y and I would like to join your list." To send a message to everyone on the list, send it to the same address.

edu_projets@rtsq.grics.qc.ca
This list was created to encourage the spread of telematics projects in schools. Like the one described immediately above, it is free, public, and unmoderated. Thus anyone can subscribe to it and post messages and ask questions. To subscribe and receive the messages, send a message through the Internet to the address listed above, saying something like: "Hello! I am X at Y and I would like to join your list." To send a message to everyone on the list, send it to the same address.

technique
This list was created spontaneously by users in the Montérégie region to allow those in charge of the computers in teaching establishments to help each other with problems.

A server distributes your request for help to the group, which focuses on the technical aspects of computers and is made up of people working mainly in the area of education, at all levels, and using different platforms.

There is no discrimination. Many people have received help from the group. If you would like further information, contact:

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C.S. Saint-Hyacinthe
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Saint-Hyacinthe (Québec)
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Fax: (514) 773-1372
Internet: mario.blais@prologue.qc.ca
First Class : Mario Blais,Prologue

The list is available through both the Internet and the First Class network of servers in Québec. To ask a question, make a suggestion, or share a discovery, send your message to **technique@prologue.qc.ca** on the Internet or to **technique,Prologue** if you are using First Class.