



# CRSP

Canadian Restructured School Plan  
Le Projet D'une École Canadienne Restructurée

**Freeze Frame**  
*Technology and its Uses*

*CRSP is a project of the*



Canadian Vocational Association  
Association canadienne de la formation professionnelle

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## Why study the topic?

There can be no doubt about it. Technology is changing the way we live. Its influence can be seen in the home, at school, at work, and in the community. Sometimes it just takes a short trip to the local movie theatre to get you wondering about how scientific and technological developments can change our lives.

Consider the movie *Jurassic Park* for instance. The film begins with a mosquito biting a dinosaur, sucking some of its blood, and flying off to a tree. Unfortunately for the insect, it lands directly on a large drop of tree pitch. The mosquito's legs become stuck and the drop of pitch gets larger, eventually completely covering the insect. The mosquito is frozen in time as the pitch hardens into amber. Now the story gets really fascinating from a scientific point of view. Since the mosquito bit the dinosaur before it landed on the tree, it should have some of the dinosaur's blood in its body. Once the scientists in the movie realize this, they proceed to extract the DNA from the dinosaur's blood and recreate some healthy and voracious carnivores!

The movie raises a number of questions about the possibilities of scientific research. Is it possible to freeze a moment in time and recreate it? Can modern genetic engineering techniques isolate dinosaur DNA from an insect? Could a scientist use gene splicing or cloning to recreate dinosaurs? In 1997, newspapers reported the successful cloning of an adult sheep in Britain. This is *not* science fiction! Do you think technology is changing fast enough to do this? How close are we to cloning humans?

Why study technology and technological advances? Because this will give you the tools to become a more scientifically literate and responsible citizen. Then the next time you are faced with a question related to science and technology, you will be able to approach it with knowledge and make an informed opinion, not one based on bias or misinformation.

## What do I need to know before I begin?

You should be able to do the following:

- access information using CD-ROMs, the World Wide Web, and the Internet
- read and summarize research in your own words
- use a word processing package that includes such tools as spelling and grammar checking
- send a text file and an identifying message by electronic mail (e-mail)
- write an annotated bibliography using standard form and format
- demonstrate your understanding of such basic scientific principles as forces and motion, electricity, radiation, and chemical reactions

## What will I know and be able to do when I have completed the guide?

You will be able to:

- Identify technological applications in your home or school.
- Describe how a technological application functions by scientific principles, laws, and discoveries.
- Explain how scientists use technology to expand their understanding of scientific principles or make discoveries.
- Understand the rapid advancement of technological applications and assess the impact, role, or influence of society's needs and interests in supporting the development of technological equipment.

## What resources are available to help me?

### Web Sites

[www.exn.net](http://www.exn.net) (*For relevant science news.*)

[www.ec.gc.ca](http://www.ec.gc.ca) (*For Environment Canada.*)

Multi-source Language Arts Survival guide (1993)

<http://www.netscape.com> and <http://www.eudora.com> (*Learn off-line.*)

<http://www.bookwire.com> (*Learn about the latest books.*)

<http://www.viewtopia.com> (*Viewtopia online art gallery.*)

<http://www.hwc.ca> (*Canadian Health Network.*)

<http://www.aquariange.org/mags/harts/index.html> (*Healing Arts*)

<http://www.eyeville.com> (*Eyeville.*)

<http://www.ceismc.gatech.edu/BusyT> (*Busy Teachers' Web Site.*)

<http://k12.cnidr.org> (*Edweb*)

<http://www.southern.edu/people/jkorson/kidhumor.html> (*Weird Science.*)

<http://www.yahoo.comm/Health> (*This site contains everything imaginable, but if you scroll down to diseases and conditions, you'll find an extensive list of diseases and conditions and the addresses of other sites with more information.*)

All of these sites were active on February 19, 1997. Please remember, however, that web sites are subject to change without advance notice. If you cannot access one web site, simply try another. Be sure to share any new sources of information you find with others.

## **Magazines**

*Equinox Canada's Magazine of Discovery.* (Cameden East: Telemedia Communications.)

Call 1-800-387-6373 for subscription information.

*Future Health.* (Quebec: Canadians for Health Research.) FAX: (514) 398-8361

This publication is somewhat technical, but useful if you are interested in the latest technologies being used in health related areas.

*Popular Science Magazine.*

This magazine can be accessed using [www.popsoci.com](http://www.popsoci.com) or the "America On Line" keyword popsoci.

"Women Heroes of Science: A Bibliography." *Science Books & Films*, (March 1991): 33-34.

*Wings--Canada's National Aviation Magazine.* (Toronto: Corvus Publishing Group.)

*Women's education des femmes.* (Toronto: Canadian Congress for Learning Opportunities for Women).

This quarterly publication contains a number of useful articles on technology. For example, Volume 9, 1 (Summer 1991) discusses design and information technology in the elementary classroom, daughters of invention, and includes a commentary on trying to teach technology as a matter of certification.

## **Books**

Bondar, Roberta. *On the Shuttle: Eight Days in Space.* Toronto: Greedy de Pencier, 1993.

Dash, J. *The Triumph of Discovery: Women Scientists Who Won the Nobel Prize.* Englewood Cliffs: Julian Messner. 1991.

Debruin, J. *Scientists Around the World.* Carthage: Good Apple, 1987.

Donaldson, C. *The Communications Handbook.* Toronto: Nelson Canada, 1995.

- Glover, D. *Make it Work! Machines*. Toronto: Scholastic Canada, 1994.
- Ives, P.C. *Creativity and Inventions: The Genius of Afro-Americans and Women in the United States and their Parents*. Arlington: Research Unlimited, 1987.
- The Jumbo Book of Science*. Toronto: Kids Can Press, 1994.
- Lakes Matayas, M., and A.E. Haley-Oliphant. *Women Life Scientists: Past, Present, and Future--Connecting Role Models to the Classroom Curriculum*. Bethesda: The American Physiological Society, 1997.
- Macaulay, D. *The Way Things Work*. New York: Dorling Kindersley Multimedia, 1994.
- McGrayne, S.B. *Nobel Prize Women in Science*. New York: Carol Publishing Group, 1993.
- Roberts, R.M. *Serendipity: Accidental Discoveries in Science*. New York: John Wiley & Sons, 1989.
- Stern, V.W., et al. *Resource Directory of Scientists and Engineers with Disabilities*. Washington: American Association for the Advancement of Science, 1987.
- Warren, R. L., and M. H. Thompson. *The Scientist Within You*. Eugene, Oregon: ACI Publishing, 1994.
- Wyse, L. *Make it Work! Insects*. Richmond Hill: Scholastic Canada, 1994.

## **Other Resources**

Newspapers.

## **CD-ROMs**

*Encyclopedia of Science. Eyewitness.* New York: Dorling Kindersley Multimedia, 1994.

*Telling Our Stories: Women in Science.* Sausalito: McLean Media, (date).

## **How may I meet the expectations of the guide?**

Complete all of the activities in this guide.

## **When should my work be done?**

It should take you about eight hours to complete all the activities.

## **How will I demonstrate I have met the expectations?**

You will submit the written work you did for each activity to your teacher (or mentor in the case of independent learners). This will consist of:

- Your handwritten research journal.
- Your report on the uses of laboratory equipment.
- Your visual presentation designed to convince others of the positive or negative influence of one particular technological instrument or application.
- A copy of the research summary that you sent by e-mail.

Your work will be assessed according to a rating scheme outlined by your teacher (or mentor in the case of independent learners).

You will also meet with your teacher or mentor and discuss the applications of technology within a given setting. Your performance during this oral discussion will also be assessed.

## What activities do I need to do?

### **Activity 1: Keeping a Research Journal**

In this activity, you will start a research journal. Before you begin, read the following guidelines:

- Write all information neatly in a notebook with lined pages. Remember to record the date each entry is made.
- Write all entries in your own words and use complete sentences. Never copy material word for word unless you plan to use an exact quotation. If you are using an exact quotation, remember to use the proper format.
- Include the correct reference and use an acceptable format to identify all reference material.
- Make an annotated bibliography of all the reference material you have used. The bibliography should be written on pages that are separate from the body of the journal.

Now you are ready to write your first journal entry. Define technology and plagiarism. You may use a dictionary, science textbooks, or CD-ROM encyclopedias to prepare your definitions.

### **Activity 2: Technology All Around You**

In your journal, list 15 to 20 examples of technology that are used in your home, your classroom, or the science laboratory. You may want to collect pictures from magazines, print images from CD-ROMs, or draw diagrams to illustrate the examples.

Research how each example of technology works. Identify and explain a basic principle of science that the technology illustrates.

Suppose one of the examples in your list was “Orbitz,” a new drink recently developed by the Clearly Canadian Beverage Corporation. The drink is a natural fruit-flavoured beverage with a difference--it has brightly coloured balls suspended throughout the drink! These highly flavoured balls return to their original positions even after you shake

the bottle. That is, they do not settle to the bottom of the bottle.

If “Orbitz” happened to be one of the items in your list, how would you explain the science involved in this drink? The drink is not a solution because it has more than one phase. It is not a suspension because the particles do not settle upon standing. You would need to decide if the chemical definition for a colloid applies. Maybe you would rather describe the drink in terms of physics by considering the specific density of each ball and determining how this influences the position of the balls.

It is important to note that technological applications may have many principles of science involved in their operation. You must decide which principles apply, choose one, research it, and then describe how the scientific principle affects the operation of the technological application.

After you have explained the principle of science involved for each item in your list, research how scientists could use each item to expand their knowledge. Write down your findings in your journal.

### **Activity 3: Instruments and Applications**

Choose a technological instrument or application that interests you.

Then try to answer the following questions:

- How was this technology first invented or developed?
- What were the needs, interest, and financial support of society in the development of this technology?
- What are its uses?
- How has this technology developed or changed over the years?
- What effect has this technology had on society?
- Can you predict how future developments in the technology will change our world? For example, think of how the use of wood stoves, then electric ranges, and now microwave ovens have changed our cooking and eating habits.

Record your research and assessment in your journal.

Here are some suggestions of technological instruments or applications you could explore, but the possibilities are endless.

⇒ The electron microscope: How is it used to conduct research on culturing cells, cancer, or the HIV virus?

⇒ Genetic engineering: What genetic engineering techniques are used in agriculture? What is cloning?

⇒ Calculators and computers: How are they used in the classroom?

#### **Activity 4: Visual Presentation**

In this activity, you will use recent newspapers, magazines, TV programs, videos, or electronic information to create a presentation that illustrates how the technological instrument or application you researched in Activity 3 has influenced society. Your presentation must clearly show how the particular technology has affected society in a positive or negative way.

The presentation must be a “visual” presentation. That is, your work must be presented in such a way that it can be easily viewed and assessed by others. The idea is to attract the interest of other viewers and convince them of your opinion

Here are some examples of visual presentations:

- Create a poster to be displayed on the class or school bulletin board. The assessing viewer is a teacher or designated person in the school in charge of the bulletin board.
- Publish an article in the school newspaper. The assessing viewer is a teacher or student editor of the paper.
- Create a graphic design and get it printed on a T-shirt. The assessing viewer is an art or technology teacher.
- Make a video and try to get the local cable television station to run it. The viewer is the technology teacher or the manager of the local television station.

You may decide to prepare your work for a younger audience. If you do, the assessing viewer could be the elementary-school teacher of your target audience.

Remember to check with your teacher or mentor in the case of independent learners before publicly displaying your work. You may

choose to work alone or as part of a group. Groups should contain no more than four students.

### **Activity 5: Field Work (Optional Activity)**

One way to see science and technology at work in our daily lives is to go and seek it out in your community. Think of the companies and scientific organizations in your own community. You do not usually have to look very far to find science and technology at work. Perhaps your teacher could organize a field trip to an appropriate site in your community. If this is not possible, then perhaps you could make arrangements to visit the site yourself.

Another possibility is a teacher-arranged classroom visit by a specialist in technology. Maybe your parents, a relative, or close family friend works in a technological field and would be interested in visiting your class to explain his or her work. If so, tell your teacher so that he or she can arrange it. If you are independent learner who is not in a formal school setting, perhaps you could arrange to meet with the specialist yourself.

Write a short report on your field work in your journal. Describe what you learned from the experience and your impressions.

### **Activity 6: Journal Summary**

In this activity, you will prepare a summary of your research journal for your teacher or mentor.

Your summary should include the following:

- The dates the work was completed.
- The research methods used. (For example, specify if you surfed the Internet, conducted a literature search of books, went on a field trip, met with a specialist in a technological field, etc.)
- An outline of how technology has expanded the work of scientists.
- An assessment of the influence of technology on society.

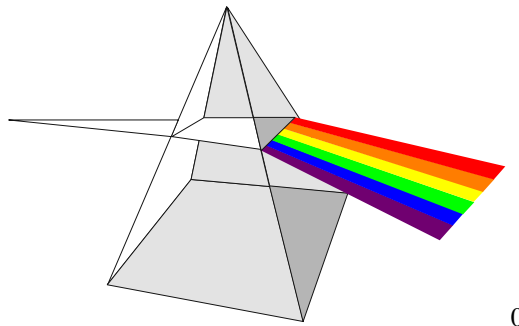
Use a word-processing program to write your summary and e-mail the

final draft to an address specified by your teacher or mentor. The electronic copy of the summary should be no longer than 500 words.

## Where do I go from here?

Do you now have a greater appreciation and understanding of the uses of technology? Do you think new technologies will be developed in your lifetime? Keep your mind and your eyes open -- you will be part of future discoveries and an important link to the past. Whatever you do, do not become frozen in time. Future research depends on furthering your education. Consider advanced courses in science and technology as you continue to learn.

Take a look at the following illustration. It shows how white light is dispersed into a spectrum of colour when it passes through a prism.



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By working through this learner guide, you have passed through a prism of knowledge. Sometimes the more you learn, the more you can see. That is, learning something new can open up a world of possibilities that were previously unknown to you. Your perspective has broadened.

You can think of your understanding of technology and its uses in this way. Where once there was only black and white, you now see many nuances of colour . . . Are all scientific advances beneficial? If we can apply our knowledge and develop a new technology, should we use it at all costs? Consider the misuses of technology throughout our history. For example, how has war affected the development of technology? Do you think the development of dynamite was a positive

or negative application of scientific knowledge? As a result of working through this guide, you should now appreciate that there are positive and negative impacts of technology on society. It is your responsibility to become an informed citizen. The fun is only just beginning . . .

## LEARNER GUIDE WRITING TEAMS

### NEW BRUNSWICK SITE

Site Leaders: Dr. Neil Wortman (1996); Chris Fleming (1997).

#### Participating Schools:

Campobello Island Consolidated School  
Carleton North Senior High School  
Fundy High School  
Grand Manan High School  
John Caldwell School  
Nackawic High School  
Southern Victoria High School  
St. Stephen High School  
Sir James Dunn Academy  
Tobique Valley High School  
Woodstock High School

#### Learner Guide Writing Teams by Subject

##### 1. Art

|                           |                                   |
|---------------------------|-----------------------------------|
| Caroline Matheson, Leader | St. Stephen High School           |
| Susan Galbraith           | Carleton North Senior High School |
| Wendy Johnston            | Woodstock High School             |
| Alison Milne              | Nackawic Senior High School       |

##### 2. Career and Life Management (CALM)

|                           |                                   |
|---------------------------|-----------------------------------|
| MacFarlane, Donna, Leader | Fundy High School                 |
| Pearl Bourque             | Fundy High School                 |
| Barbara Colwell           | Carleton North Senior High School |
| Paul Ingram               | Fundy High School                 |
| Carol McMillan            | Fundy High School                 |
| Derek O'Brien             | Fundy High School                 |
| Lynn Reid                 | Tobique Valley High School        |

##### 3. English

|                        |                            |
|------------------------|----------------------------|
| Robert Griffin, Leader | Grand Manan High School    |
| Sharon Dewitt          | Tobique Valley High School |
| Robert Lee             | Fundy High School          |

4. French

|                      |                             |
|----------------------|-----------------------------|
| Don Albert, Leader   | Nackawic Senior High School |
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| Tom Bridgeo          | Woodstock High School       |
| Fiona Cogswell       | School District Office      |
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| Sylvie Sirois        | John Caldwell School        |

5. Mathematics

|                         |                                   |
|-------------------------|-----------------------------------|
| Clifford Kilcup, Leader | Southern Victoria High School     |
| Alan Gilmore            | St. Stephen High School           |
| Glenna Monteith         | Southern Victoria High School     |
| Donna Seymour           | Nackawic Senior High School       |
| Ivan Shaw               | Carleton North Senior High School |
| Pat Sorenson            | John Caldwell School              |

6. Music

|                          |                             |
|--------------------------|-----------------------------|
| Diana Bainbridge, Leader | Fundy High School           |
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| Alison Milne             | Nackawic Senior High School |

7. Physical Education

|                   |                               |
|-------------------|-------------------------------|
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| Mike Fletcher     | Woodstock High School         |
| Al McGarvie       | Nackawic Senior High School   |
| Hal Mersereau     | Fundy High School             |
| Eric Rolbichaud   | Tobique Valley High School    |

8. Science

|                       |                             |
|-----------------------|-----------------------------|
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| Linda Drisdelle       | Tobique Valley High School  |
| Kathy McGuire         | Nackawic Senior High School |
| Maura Tait            | Fundy High School           |

9. Social Studies

|                     |  |
|---------------------|--|
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| Scott Jones         | Woodstock High School                      |
| Larry Parker        | St. Stephen High School                    |
| Trevor Perry        | Carleton North Senior High School          |
| Keith Pierce        | Campobello Island Consolidated High School |
| Rick Savage         | Tobique Valley High School                 |

10. Technology

|                        |                                   |
|------------------------|-----------------------------------|
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| Chris Fleming          | School District Office            |
| Brent Shaw             | Carleton North Senior High School |
| Chris Sherwood         | St. Stephen High School           |

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