USING TELECOMMUNICATIONS TO ENHANCE THE GRADE 8 SCIENCE CURRICULUM

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ABSTRACT

The primary objective of this study was to implement a project that utilizes telecommunications as a tool to enhance the grade eight science curriculum. The process of becoming prepared to undertake this study was examined and documented so that teachers in all subject areas at all grade levels could use it as a guide for similar projects.

It was proposed to do this by conducting a collaborative project in which the students would use the scientific method to develop research questions that could be used to discover why the incidence of asthma is so high in Central Alberta. These questions would be sent out to schools across Canada and then the data would be analyzed and interpreted. The results would be shared with all participants as well as asthma researchers. The study met with many barriers which impeded the progress as well as made it impossible to fulfil the original goal of having the students collaborate with the experts and contribute their own research to the field. When embarking on a new project using technology it is inevitable that there will be barriers. Through repeated reconnaissance we were able to adjust our goals and still pursue very worthwhile, but very different computer and telecommunications projects.

The students attitudes towards learning science, science in society and computers were measured by pre and post surveys. The findings showed that the students were aware of the importance of all of these factors in their lives. Without completing the asthma study, it is impossible to know how much of a

difference there would have been in the results. The qualitative results showed very clearly that computers are a motivator for students. They enjoy working on them and the challenge they present. Many of them will do extra homework so that they can take advantage of every opportunity to work on the computer.

Unfortunately, many teachers do not have the time or support to learn enough about the Internet/SchoolNet and what is available to take full advantage of what it has to offer our students and ourselves. For the most part, there are few teachers in each district becoming involved. This will change over time only if there is a support system in place and the pioneers share what they have learned. We cannot run the risk of the forerunners becoming discouraged and giving up. The Internet is a global community. For that community to grow and flourish we must share what we have learned and provide the means to make the path smoother for those who follow. Through this study, the projects have been documented and resources have been prepared that are intended to help others get online and access a wide variety of resources that are sure to enhance all programs and professional development.

ACKNOWLEDGEMENTS

This project met with many barriers which at times seemed insurmountable. The author is indebted to all members of the committee for their words of encouragement which stressed that it is not the end product that is of ultimate importance but the route we travel to reach it. This was a valuable lesson in perseverance.

Dr. R. Mrazek understood the frustrations and modelled the behaviours of a superior educator in asking the questions to focus thinking so that the light at the end of the tunnel was visible.

The author also appreciates the enthusiasm of Dr. R. Gall when approached to be on this committee. He ensured that the project retained the original intent and remained focussed.

Dr. R. Runté has kept this project in perspective. He is very aware of the amount of time and energy required but stressed that it was not at the expense of health and well-being.

The author is also appreciative of Dr. P. Darby's willingness to serve on this committee and to offer help at all times. He has made the time in an extremely busy schedule to take part.

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My husband, Brad Jacobs, has been a very strong motivating force behind this project. A very sincere thanks for believing in this goal and instilling the confidence that it can be realized.

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CHAPTER 1

INTRODUCTION

1. Background and Justification for the Study

"During a period punctuated by rapid global changes, our classrooms are isolated caverns locked from the very reality we are supposedly preparing our children to face" (Thornburg, 1992, p. 115).

We need to prepare our students for their future by providing them access to the growing body of information and technology that is available. This will provide them with the opportunity to research and explore current issues and hopefully instil the desire to be lifelong learners. We must actively involve students in the process of learning science. To be successful, we must ensure that the activities we provide are relevant to the students' lives.

According to Isabelle Bruder (1993):

> At no other time in the history of the human race has science become such a critical part of our lives. We cannot eat (what pesticides was that apple sprayed with?), breathe (do we want lower car emissions at the price of lost jobs?), have a baby (should you use disposable or cloth diapers?), or take a walk (what is the ozone today?) without confronting complex scientific questions (p. 20).

One can no longer pick up the newspaper without being faced with issues that require a knowledge of science so that one can make a responsible decision. To understand the issues one must be scientifically literate (Hazen & Trefil, 1991, p. xi). It is the schools' function to provide our students with the foundation that will enable them to acquire the facts they need. To do this we must make science in school meaningful to their everyday lives.

The National Research Council (NRC) has implemented a project that

identified the characteristics of a quality science education. According to their findings an understanding of science is an essential component of a person's abilities to:

> function well and make informed decisions in the home, community, and workplace; continue to learn for personal, professional, and civic reasons; understand the relatedness of the spheres of human activity and the influences of culture and context on human understanding (Bruder, 1993, p. 21).

The trend in the literature is clear. We need to restructure our curriculum in such a way that we provide our students with the skills to be productive, informed citizens. We see the purpose and we know what must be done, but very little has been explored on the process. The Government of Canada has recognized the need to provide teachers and students access to the information technologies that are becoming prevalent in industry and education. The SchoolNet program is a means for educators to provide current and relevant learning experiences for their students.

1.1 SchoolNet

The Canadian Government has recognized the importance of providing students an opportunity to expand their classroom experiences and has taken action by supporting the SchoolNet network. SchoolNet is a cooperative federal/provincial/territorial and industrial initiative announced by the Prime Minister, Campbell, in August 1993. The SchoolNet information brochure states that "the objective of SchoolNet is to enhance educational opportunities and achievements in elementary and secondary schools across Canada by electronically linking them and by making national and international education resources available to Canadian teachers and students."

The original plan in 1993 was to link 300 pilot schools. By the spring of 1994 more than 1000 schools were already on line. Eastview Community School in Red Deer, Alberta was notified December 15, 1994 by Alberta Distance Learning that we were selected to be one of thirty pilot schools from our province and three hundred Canada wide. The selection committee was composed of representatives from Alberta Education, Alberta Teachers Association, CASS, Public Works, Alberta Research Council and University of Calgary. To be selected the schools needed the hardware and software to run a 9600 baud modem, a dedicated phone line and a project that the school was willing to conduct on SchoolNet (see Appendix I, Section 1, p. 138). For the 1994-95 school year we were provided free access to SchoolNet. Using the dedicated phone line within our school we could access the Internet as well as the SchoolNet resources.

All other schools have access to SchoolNet free of charge if they have access to the Internet via one of the commercially available Internet Services. In June 1994, each pilot school in Alberta needed to evaluate their progress and experience for Alberta Distance Learning. Each province submitted their evaluations to the National SchoolNet Committee so that the success of SchoolNet could be evaluated on a national scale (see Appendix I, Section 2, p. 138). By July 15, 1994 it was decided the project would be continued in the fall. We had met the requirements established to maintain our status as a SchoolNet pilot school which meant that we automatically would be reconnected when the access was once again available.

The evaluations were used to make improvements for the upcoming school year. Feedback from the previous year indicated that

teachers needed SchoolNet to be user friendly because we did not have time to learn the Unix commands that were necessary to navigate the previous year. The second year of implementation took this into consideration by providing a text and graphical interface. The programs we used were Mosaic and Netscape. These programs use a Graphical User Interface (GUI) and Hypertext Markup Language (HTML) which allows one to click on words that will link one to more information. One no longer needs to understand a computer language to get around and find information. HTML works in a non-linear fashion. Eddings (1994, 141) explains that:

> you can jump around in hypermedia documents and explore related documents at your own pace, navigating in whatever direction you choose. For example, if a document mentions the space shuttle, you can choose to see a picture of the shuttle taking off, jump into a history of the shuttle program, and then jump back to the original document.

These programs are still in the development phase and are continually being updated. It is necessary to use the Internet to download the latest version to your own computer because with each phase of development there seems to be fewer bugs and more features.

Many resources have been added to the SchoolNet site and efforts are being made for the forerunners in this project to share their experiences and projects with others. Efforts must be made to support one another and share ideas if the SchoolNet Project is to reach its potential.

Each province is responsible for providing their schools with the support, connections and servers to access the Internet. Much of this equipment was donated by the corporate sponsors. Alberta Distance Learning coordinates the program and Alberta Education provides the

technical support. As well, Alberta Education provides a site on the internet that informs schools of the latest progress and the problems others are encountering.

Alberta Distance Learning anticipated having the pilot schools online for the second year by October 15, 1994. This date was delayed until November 30, 1994. At that time a server was not available to provide schools with e-mail access. The funding did not materialize during the 1994-95 school year which meant projects requiring e-mail had to be modified to collect information by another means or schools had to provide their own e-mail access. Alberta Distance Learning and Alberta Education are continuing to work towards providing the schools with e-mail access for future years.

There have been many excellent projects carried out making use of this technology that a few years ago we would never have dreamed having available in our classrooms. A large number of teachers have experience with computers and related technology "and for most of us the experience has been both stimulating and frustrating" (Dyrli and Kinnaman, 1994, p. 16). These authors support my experience from last year in that "nothing turns a teacher on to technology like seeing previously unmotivated and underachieving students become enthusiastic about learning and successful in achieving important educational goals" (p. 16).

Unfortunately, many teachers have experienced a great deal of frustration because many of the new ideas that are brought into education lack the support and professional development that teachers require. Teachers may find the perfect software for their curriculum only to find out that it will not run on their computers and the

computers they need cannot be purchased out of limited budgets (p. 16). A new concept may be imposed on teachers with initial inservice but all too often it seems to end there. Once the implementation is under way the support is gone. I feel that a project of the magnitude of SchoolNet requires initial inservicing and follow up support. It was my experience last year that it is very difficult to remain motivated when there is not a lot of support near by.

As with any technology, things go wrong that are beyond our control. For example, the phone line may be busy for hours on end, addresses change, people do not respond; the list of complications is endless. An analogy of these frustrations would be to go to the library and find out it is locked even though the hours indicate that it should be open. Once inside one discovers that the Dewey Decimal system is no longer in use and no one has had time to record the new system. Even experienced computer users may find that rapid changes in technology can turn a specialist into a novice overnight. Adding to these problems, it is very possible that the other participants will get very busy doing their own projects which makes it very difficult to find the time to write back to help with yours. In spite of the frustrations I firmly believe that this is an avenue that we must explore. The benefits that students and teachers receive will make it all seem worthwhile in the end. There are growing pains with any new project. The last two years have been very productive in improving the SchoolNet project which expands this wide array of opportunities for students and teachers.

The task we now have is to examine how we can use the technology in our classrooms. Without careful planning and

implementation it could destroy our program by allowing the technology to become the focus. We need to learn to use it as a tool for research and collaboration. Technology cannot be an add on to our already packed curriculums but should be used to replace something we are currently doing that may be outdated or less effective.

2. Statement of the Purpose

My goal in this study was to examine the process of integrating telecommunications into my teaching practice while providing the students with a valuable learning experience which was intended to create an awareness of the vast amount of current information and resources available to them.

The primary objective of this study was to utilize telecommunications as a tool to enhance the grade eight science curriculum. This was done in a variety of ways. Foremost, was the continuation of the Canada Wide Asthma Study started by grade 8 students the previous year. I believe that to truly make this a worthwhile project the students should have the opportunity to share their findings with the research community. I modified the project based on my previous experience and continued with the Asthma Study using our SchoolNet account as our means of linking to the Internet. A project of this magnitude requires that the students acquire many computer skills as well as a comfort and confidence in working on a computer. To facilitate this I used many opportunities to utilize the computer in the science class throughout the year. Pre and post surveys measured any attitudinal changes. Ultimately, I wanted to know if this project did in fact enhance the science curriculum.

My secondary objective was to examine the process required to implement a new technology into the classroom, to discover how it has affected my teaching practice and relationship with the students. I have identified the problems which I encountered and I have used this information to help me develop into a potential resource person for other teachers who wish to implement a similar project in their classroom, as well as creating a package which can be used for teachers new to the Internet.

Based on my experience working with SchoolNet for two school years, 1993-95, I have developed some strategies and ideas have emerged that will help other teachers incorporate telecommunications projects into their year plans.

3. Summary of the Design

3.1 Past Involvement

I believed that there would be a great deal of competition to be selected as a pilot school for the SchoolNet project. I did not want to select a topic that would be common. I also wanted to ensure that the topic would be interesting and relevant for the students. Along with these criteria, I felt that it was essential that it fill a void in the program I was offering my students.

The Alberta Education Science Curriculum focuses on the integration of Science, Technology and Society. I felt that I was not providing my students with an experience that would really capture their interest and show them how these three themes do fit in with their everyday life. My goal was to choose a topic that would use technology as a tool to examine an issue that was becoming a problem

in society. Science provided the method we would use to examine the issue. I did not accomplish all that I had hoped in the first six months due to time constraints and the difficulties encountered with the system. I also did not budget enough time for learning the system before getting the students involved. The problems that we encountered as well as our successes are summarized in the May evaluation that I submitted to the Alberta Distance Learning Centre (see Appendix I, Section 2, p. 138).

I believed that conducting a Canada Wide Study on Asthma would meet the above criteria. We submitted our proposal in November, 1993 (see Appendix I, Section 1, p. 138) in which we outlined a five year plan for the asthma study.

For the first year of the asthma study, 1993-1994, we were fortunate to have the support of the Alberta Lung Association in Red Deer through Colleen McPhee and Dr. Patrick Hessel from the Alberta Asthma Centre in Edmonton. Both of these resource people proved to be invaluable to the project. During the year they each made a class presentation about asthma and research as well as providing ongoing help and information. Dr. Hessel provided us with a survey to get started gathering information. These surveys contained the questions that he wanted the answers for and then students would follow up with their own questions to the students involved in the project (see Appendix III, p. 175). The participating schools were instructed to return the surveys to the Alberta Asthma Centre where they would be compiled and organized so that the students could analyze the results.

3.2 Asthma Project

The grade eight students agreed to participate in the asthma study that I proposed to them. I explained the reasons I chose the topic "asthma" to them and they supported the rationale. Asthma is a disease that most Middle School students have heard of but are generally unaware of what it means or how to help someone who is having an attack. It is current. There are still a lot of unanswered questions concerning asthma on which students can collect data. According to the Canadian Lung Association (1991):

> Childhood asthma affects 10 per cent of Canadian children. Asthma is the principal cause of school absences attributable to chronic diseases in childhood accounting for 20 per cent of school days lost in elementary and high schools. Acute asthma is the most common medical emergency in children and is responsible for increasing death rates. The Allergy and Environmental Health Association (1993) believe that the increase in asthma is largely due to indoor air pollution. Children are more susceptible than adults because of their smaller body mass relative to the volume of air that they consume (p. 1).

With rising health care costs asthma is becoming an issue to society. According to an article about asthma which appeared in the Red Deer Advocate June 5, 1994 (A6), "it's estimated Canada spends more than $600 million each year when medical care, drugs and economic costs like lost work days are factored in." Answers must be found so that people can be educated about the disease, learn to recognize their triggers in the hopes of avoiding them, take their medication properly and monitor themselves so that they can reduce the number of attacks that they suffer. According to Dr. Hessel (1994) of the Alberta Asthma Centre, asthma is the only treatable, lifelong condition with a rising death rate in the Western World. This statistic

is horrifying when one considers that each of these deaths is preventable through education. The SchoolNet Project provided an ideal opportunity to involve our students in a highly relevant project that would allow them to perform an original scientific study using technology to examine a societal issue.

In January, 1994, after we were accepted as a Pilot School, I contacted the Alberta Lung Association to find out what had been done in Asthma Research and to gather resources. I was overwhelmed by the help and support that they were willing to offer. They put me in contact with Dr. Pat Hessel from the Alberta Asthma Centre who was currently involved in a province wide asthma study. He came to meet with me the next week to offer advice, help and encouragement. He was very impressed by the project and wanted to become involved in what he believed would turn out to be the largest study of its kind done in Canada. He offered to pay for the shipping of the surveys to his office where the researchers would compile the data and return the data to the students in tables so that they could analyze and graph it to look for connections.

3.3 Status of the Project as of June, 1994

At the end of June, Dr. Hessel contacted me to share the interest that this project has generated. Other teachers have heard about the project and want to be involved as well as Glaxo Canada Incorporated, a major manufacturer of asthma medication. This adds one more interesting dimension to the project that I felt was worth pursuing. The students will be able to share the data they collect with researchers in the field. With the help of the SchoolNet project, Alberta Asthma

Centre and Glaxo Canada Incorporated we decided to continue our research on asthma. The students would identify their own research questions regarding factors that may contribute to asthma; the professionals would provide them with input and make suggestions so that the students could gather the data that they intended. These questions would be sent to students across Canada along with the "Canada School Health Survey" prepared by the researchers at the Alberta Asthma Centre to find out if we could identify a link that would help explain the rising incidence of asthma and the geographically unequal distribution of asthmatics.

3.4 Student Involvement

The group of students involved in the project was one of the grade eight pods which is made up of three randomly chosen, heterogeneous groupings of 29-33 students. In keeping with the middle school philosophy, we have teams of core teachers working with a common group of students. None of these students had instruction at Eastview Community School on using Macintosh computers. If they had used the Macintosh computers at school, it was probably for word processing or games because up until April 1995 we only had 5 Macintosh computers set up as a mini-lab in the library for students to use. In April we had a computer lab converted to 30 LC475s. Up until then we had two Apple IIg computer labs that were utilized mostly for language arts.

The group of students individually completed attitudinal surveys in September and May to measure the effectiveness of the project in terms of attitudinal changes in their view of science, learning

science and working with computers (see Appendix II, p. 164).

4. Delimitations

The primary aim of the study on using telecommunications in the grade 8 science class is to determine the effects of using telecommunications in a classroom situation to examine a current societal issue on the attitudes of grade eight science students.

The second aim of this study is to examine the process of integrating a telecommunications project into one grade level and subject area, specifically the grade eight science curriculum. The findings from the research are intended to be used as a model for implementing a telecommunications project in all subject areas for all grade levels.

5. Limitations

The study of using telecommunications in the grade eight science curriculum has the following restrictions. Firstly, the students' previous computer knowledge and attitudes will have a direct influence on the project outcomes. For this reason, I will use a computer attitude scale to determine the individual student's comfort level.

Secondly, the attitude scales that I used have been pretested for validity in other studies (see Appendix II, p. 164). I will not have a control group in this study to compare with the experimental groups pre and post test results to determine if there is a significant change.

The third limitation is that the topic for the telecommunications project has already been determined, without input from the students. This was necessary because we had to commit to a project that we would coordinate on

SchoolNet in November, 1993.

Lastly, due to budget limitations, the students will only have access to one modem and dedicated phone line, a phone line that will be used only for SchoolNet and is not on an extension, and therefore, only one computer at a time can be linked to SchoolNet and electronic mail.

CHAPTER II

REVIEW OF THE LITERATURE

This literature review draws together information found within the four walls of the libraries as well as the resources available through the Internet and correspondence with others involved in bringing telecommunications in the classroom. The review of these resources focussed first of all on the impact of technology on the teaching practice and the curriculum. The focus will be on the need to change the curriculum and teaching methods. This need becomes more evident and possible when teachers begin to communicate with their colleagues globally. Inherent in this discussion are the ethical issues which arise when students are accessing the Internet. Secondly, the review will site examples of telecommunications projects that have been implemented and the implications for this study. Research on the advantages and disadvantages of conducting research using telecommunications, specifically electronic mail, will be discussed. Lastly, the review of the literature will examine action research as a method of studying personal practice.

The review of the literature will outline the need for a change in our curriculum, content and practices, so that we can better prepare our students for their future. The literature supports the view that our programs are outdated. To remedy this problem we must keep up with the explosion of information using the available technology and make it accessible to our students. We must have a clear picture of how technology can help us make this transformation. There are many examples of telecommunications projects that have been developed in the United States in the past few years.

Beginning in the fall of 1994 the Canadian SchoolNet initiative has been encouraging Canadian schools to become involved in collaborative projects. Before it is feasible to use telecommunications in the classroom an incredible amount of time must be spent familiarizing yourself with the technology, programs and resources available. Coupled with that is the many logistical concerns which have been a hindrance to ourselves and many others. However, through the literature and online discussion groups the forerunners in this area have addressed these frustrations and made recommendations for the future so that other teachers will not be as overwhelmed by the prospect of becoming active participants. It is essential for the pioneers in this area to document their progress and to make recommendations because it is very clear that we need to improve our science courses to prepare our students for a future that will involve technology.

Linking computers globally can have a positive impact on what happens in the classroom if it is well planned and carefully implemented. Using these networks requires that educators reexamine their role when working with students as well as the curriculum and skills we are teaching them.

1. Preparing Students for Their Future

Austin, Caracheo, Davis, Henao, Morgan, et al, members of the Technology Advisory Council, Oregon (1993) believe that at the turn of the century the education of students in public schools was based on rote memorization, drill and practice. They believe that the total base of knowledge has grown to the point that it is no longer practical to expect

students to learn by the traditional means. According to James S. McMann, Superintendent, Lamphere, Michigan Schools,

> realizing that today's current body of knowledge will double in approximately 800 days, one quickly understands that the traditional classroom model is no longer the effective delivery system. Teacher lectures, textbooks, workbooks, dittos—the traditional 'teaching tools', cannot stay current with the knowledge explosion. The focal point of the instructional delivery process must change. (AMTEC, 1994)

A substantive body of research (Austin (1993), Bruder (1993), Hazen & Trefil (1991), Roberts (1990), Thornburg (1992)) indicates that we need to incorporate technology into our lessons.

1.1 Government Expectations

In March, 1992 "The Future Roles of Schools: Selected Perspectives," a working paper prepared for the Council on Alberta Teaching Standards was released in response to the growing concern about the future of the Canadian education system. This document is a compilation of documents that outline "specific expectations or broader roles for both schools and teachers" (p. 1). One of the central themes that emerges throughout the document is that we are preparing students for their future. To facilitate the transition from school to the workplace it is imperative for there to be communication between the schools, the government and the business sector to find out what the expectations are for the young people entering the work force. Julia Stapelton states, "if we want our students to compete in the global, dynamic, information-intensive world, they need more than paper, pencils, books, and some manual training" (AMTEC, 1994). Bostwick, McReaddy and Nipper's research has shown that "the five most effective instructional procedures as identified by the teacher

respondents include listening to the teacher lecturing, silent reading in textbooks, using the overhead projector, copying material from textbooks or the chalkboard, and viewing educational television." Students ranked computers as number one followed by silent reading, educational television, film projection and copying from the chalkboard. Three of their top five include the use of technology (AMTEC, 1994).

The document entitled "Values and beliefs underlying the vision and action plan" from Alberta Education states that schools are called on to "focus on teaching students how to utilize rather than merely acquire information; [and to] utilize technologies in the provision of services to students." In November, 1990 the Minister of Education presented a "Vision for the nineties: A plan of action" which identified areas of education that require attention. In this document it states that schools are required to "focus more on helping students: develop conceptual, analytical, critical and creative thinking skills; learn how to learn; and apply these skills in everyday life" (p. 4). It later states that technology should be utilized "to a greater extent to enhance teaching, expand learning opportunities and help improve student learning" (p. 7). This same theme is supported in the Government of Alberta document entitled "Toward 2000 together: A discussion paper on Alberta's economic options and choices". Schools are called on to

> prepare students to utilize the old, new and emerging information technologies to meet personal objectives as well as in the generation of wealth; encourage greater participation by girls in science and technology programs and encourage all students to consider science and engineering as attractive career options; and contribute to the development of a technology-oriented culture where Albertans are more aware of the

> importance of science and technology to continued prosperity and quality of life (pp. 22-23).

These statements validate the use of the Internet in the classroom. Never before have we been able to bring so many resources into the classroom at such a low financial expense. These resources are current and updated frequently. There is also a wealth of historical information available. However, we cannot expect students to innately know what to do with the information once we show them how to retrieve it. We have to provide students the opportunities to critically examine and analyze the information in front of them so that they can determine if it is relevant and meaningful for them.

1.2 Role of the Teacher

Educational practices need to change to keep up with the world. According to Sellers, 1994, use of the Internet shifts focus away from a teacher-as-expert model and toward one of shared responsibility for learning. Now we must decide, what it is that we want students to learn and the role that technology should play in helping students acquire the desired, knowledge, skills and attitudes (p. 14). Dyrli and Kinnaman (1994) support the view that "recognizing the need for change, however, does not translate automatically into appropriate action" (p. 92). Caution must be taken to ensure that the technology is used wisely and is well planned. We must carefully plan the role technology will play in the classroom. We must remain focussed on our goal to develop the desire in our students to be life long learners. For that reason, we must place pedagogy before technology so that we do not run the risk of misusing technology and giving it the power to

destroy (Thornburg, 1992, p. 49).

> Doing inappropriate things better and faster with technology is not an improvement. Rather, you want to do more useful things to produce a highly capable work force, not only a highly skilled one. Our challenge is teaching people how to learn and motivating them to keep learning throughout their lives (Rockman, 1993, p. 31).

Educators must be willing to reassess their instructional strategies so that they can prepare their students for a future in a technological society. "For educators who have already discovered electronic communications, its use has been the catalyst for a paradigm shift." Educators using the Internet are not willing to accept "isolation and resource deprivation which have been the norm for so many years in our schools" (K-12 Network Planning Guide, 1995, chapter 3). The report to the National Education Goals Panel, "Achieving Educational Excellence By Increasing Access to Knowledge" (1993) stated that:

> in the last decade of the twentieth century, teacher-centered, textbook-oriented education is largely obsolete. Internetworked communications offer students access to more information than teachers can possibly master, as well as an immediacy and currency of information that textbooks--periodically adopted and distributed--can never maintain.
>
> Effective use of this technology requires that teachers shift from whole-group, frontal instruction to coaching individuals and small groups of students, and move from 'telling' information to 'facilitating' information-gathering and the integration of knowledge (cited in Teach, 1994, Chapter 3).

We do know that students learn when using technology. What we need to decide is which technologies should be used, when it should be used and how we can improve the effectiveness of the instructional material (Rockman, 1993, p. 31). Textbooks are expensive and it is impractical to think we can replace them every few years. Often we are forced to use the same text years after the information is

outdated. We would be doing the students a great service if we provided them up to date information (Austin, 1993, p. 18). This is possible via computerized databases that are accessible via the SchoolNet network. This is not meant as an attempt to replace books, which will always have a role in education, but to provide more sources of information to what is currently available.

1.3 Curriculum Changes

Providing students access to more information is not enough. According to the Ontario Ministry of Education (1995), we must endeavour to provide students the opportunities to acquire the skills to "find, manipulate, analyze, communicate and store information."

> Faced with new technologies and a wealth of information, the task of finding and selecting information and using it to solve problems is overwhelming. To thrive in a world of abundant information, students need to be information literate (Ontario Ministry of Education, 1995).

> Communication via the Internet is also having a significant impact on the resources available within classrooms. The Internet is connecting students and teachers to other students and working professionals worldwide, literary and scientific archives, book and movie reviews, full texts of plays and poems of hundreds of authors, electronic newsletters and journals, US Supreme Court opinions, the CIA's vast collection of data on every geographical region of the world, collections of humour and folklore, bibliographies, up-to-date weather and earthquake conditions and forecasts throughout the world, lists of Internet-accessible news groups, mail lists, services and help/reference documents, and many, many more sources of information which support students to become self-directed learners and teachers to become flexible and well informed (California Department of Education, 1995).

We must teach students to deal with this information because

this is a skill that they will need for the rest of their lives (AMTEC, 1994). We are an information society. The Ontario Ministry of Education and Training states:

> to thrive in a world of constant change and to succeed in an economy increasingly based on information, students must be information literate; that is, they must be able to find, critically examine and use information to solve problems as they continue their studies, as they work and change careers, and as they strive to achieve satisfaction in their personal lives (Ontario Ministry of Education, 1995).

The Ontario Ministry of Education believes that it is imperative that all students have equal access to the information so that all students will have the opportunity to succeed. "In particular, information literacy is the key to helping students become lifelong learners...who are capable of responding constructively not only to conditions we can foresee, but to those we cannot yet imagine." The discussion paper also states that students need to be able to choose the best information from the many sources available to them.

> They must be able to evaluate the information; that is detect bias, to differentiate between fact and opinion, to identify perspectives, to weigh conflicting opinions and to evaluate the worth of sources....In a changing world, these information skills are far more important than memorizing facts--facts that may be obsolete tomorrow. (Ontario Ministry of Education, 1995)

Dyrli and Kinnaman (1994), believe that:

> there is no trend more important to the future of technology-and to education--than networking. For many people, the term still brings to mind a picture of a classroom full of connected computers, but that is not the networking that will define the future. The future of networking and its impact on education can be summed up by two terms: *global telecommunications and multimedia* (p. 98).

To deal with the phenomenal growth of information available

we must make use of the telecommunication technology that is becoming readily available to educators. It is not enough to lead our students to the information (data). "It is the function of the human being to convert this information into knowledge that can be used in some purposeful way" (Thornburg, 1992, p. 133). If there is a thorough, well thought out plan for implementing the technology "telecommunications can greatly enhance science and social studies curricula by providing for more access to current data and information than most libraries. By expanding communications beyond our classrooms and schools telecommunications bring together people with different perspectives and expertise" (Roberts, 1990, p. 115). Roberts states that "perhaps the most exciting use of telecommunications in science classrooms is the development of collaborative research projects. This is where student science becomes real science" (p. 122).

1.4 Role of the Internet

According to Roempler and Warren, "telecommunications can add vitality and excitement to the classroom. Students and educators see subjects come to life as they study topics such as tropical timber resources, environmental crises, or the AIDS pandemic" (Computer Networks for Science Teachers, 1993). As an example, in the spring of 1995 the Internet provided a vast amount of current information on the Ebola Virus outbreak. This information was very easy to access and articles were written for researchers of all ages. Sellers (1994) discusses the many benefits of using the Internet in the classroom. Using the Internet will provide current, original source information in the form of text, sound, graphics, and video that otherwise would not be

accessible to students and "it does this almost instantly" (p. 2). Students are able to watch, listen to and read the journals of the astronauts linking up with the space station Mir before it is televised. Networks allow one to contact people from all over the world, bringing their expertise into other classrooms as well as contributing to the teacher's professional development. Networking provides the opportunity for professionals to share with their colleagues on a global scale.

> Networking is also reducing the intellectual isolation of classroom teachers by facilitating global collaboration among teachers and scientists, business people, university faculty, and specialists in electronically linked communities or virtual communities. . . In addition to creating dialogue they encourage exploration, teamwork, experimentation, open communication, and, perhaps most importantly, support the sharing of good practices (Teach, 1995).

This interaction eliminates the feeling of isolation common among teachers. The Internet removes barriers that may be a hindrance. "Because class, race, ability, and disability are removed as factors in communication while using the Internet, it is a natural tool for addressing the needs of all students" (Teach, 1995). Much of the communication can take place simply by reading what is available on the Internet or by communicating directly through electronic mail.

1.4.1 Ethical Issues

The implications of this networking are overwhelming. A definite concern of parents and educators is the well known fact that anyone can access inappropriate information in the form of text, graphics and sound. In school, we cannot leave students unattended on the network for this reason. There must be a stringent user policy in place with clear consequences for

inappropriate actions (see Appendix VII, Section 3, p. 221). The students and parents must sign these policies so that there is a clear understanding of what is involved. Using the Internet is a privilege which should be withdrawn if the user cannot follow the guidelines.

Internet users must be aware of the undesirable aspects of the Internet so that they can make decisions for themselves. For instance, if a student is participating in a newsgroup for students they must be aware that others are watching what is going on. The students must be very selective when deciding what personal information about themselves they will make available to a global audience.

If students are accessing projects that have been done by others, it would be very easy to save it to their own disc and then print it out with their name on it. Chances are it would never be traced to the author. The downloading of information may bring with it a virus that someone has programmed in. This could have a disastrous effect on a school network.

1.4.2 SchoolNet Focus Group Interaction

In this study of the use of telecommunications in the classroom it was important to receive input from those that are actively involved and willing to share their experiences and insights. SchoolNet provided a forum for teachers to communicate with one another for May and June, 1995.

The focus group responded to the question, "What do you feel is the primary value of using the Internet in the classroom?" H. Thompson:

> sees the chance to share ideas in forums [I] never thought possible. I see the chance to gather information that's not in any local library, and help others who might not have found the answers to their questions without such a wide base to draw from. Teachers often feel isolated. Internet makes us a community that doesn't have to meet at any set time in a world that seems over scheduled already.

Another participant, R. Darrow from California, believes the value of the Internet is the "immediate access to any topic/research material-sharing of information among people, schools, students, teachers." The example he referred to was North Carolina Public Schools. From this site teachers may access "virtually any lesson on any topic for any grade level with information relevant to whatever they teach." He also believes that the computer and Internet is a motivator because getting information from the Internet is exciting as well it provides students with the information that allows them to study and report on subjects that are happening today not what happened a hundred years ago. The moderator suggested that this may become a concern if the students focus only on the future and ignore history. There is a lot of historical information on the Internet and teachers must also draw from that source so that this concern does not become a reality. Remembering that the Internet is just one tool for gathering information will alleviate that problem. Assignments may need to change focus so that they focus on past, present and future whenever possible. This would require students to use a variety of resources and then to examine the information, look for patterns and then form hypotheses of what may happen next. R. Steenwinkle from

Edmonton expresses the concern that students have to separate fact from fiction on the Net and that we have to begin doing that in the classroom.

L. Stilborne's weekly summary reported that "the two key areas in which participants felt that the Internet has a major impact are its potential to facilitate student research and its ability to link students to a global world." With access to an extensive amount of information the role of the teacher is no longer one of the expert. The Internet can bring the experts to the classroom virtually. The Internet was seen as a means of providing students with a dynamic, interactive learning environment that connects the classroom to the real world. This connection will help make learning meaningful. This is the key to lifelong learning.

Another benefit discussed was the potential of the Internet to expand the audience for student's work. It was reported that students will take greater care in their work when they know others will view it. Participants from rural communities see the value of the Internet in reducing isolation. Having access to the Internet provides the students with equal access to resources both human and otherwise. Some library books currently stocked in the library are used very little. An alternative would be to use the Internet to provide the information instead of spending the money on books that are seldom signed out. This will reduce the risk of having little used books that become outdated.

These positive aspects of the Internet dictates a change in

our teaching methods. L. Dunbar from Baltimore states that we "relinquish the direct power role, and become facilitators of their learning." Others agree that changes must take place but no one in the discussion group knows how we should go about doing that. A concern is that we now know we need to change our approach in the classroom but not enough thought has gone in to this. It must be carefully planned or we will find ourselves with one more great idea that is no longer being used because of lack of support and planning. S. McAuley from Iqaluit, Northwest Territories wrote:

> I don't think enough thought and effort is going into the development of pedagogies that will integrate Internet access into effective classroom learning situations. It's wonderful to talk about the teacher as "facilitator," but I think classrooms have to fundamentally change if that's to happen. I don't think enough acknowledgement is given to what a difficult and uncertain process that is.

Another participant, D. Lehnis, suggests that, "we must first learn how to use it. Then we need to figure out how best to teach our students the power of the tool."

Many of the group's participants wrote about the motivating factor of the Internet. S. McAuley wrote that she agreed with that for now but believes as the Internet becomes familiar to the students that will not be the case. She still believes that electronic networks are the key to providing students with the opportunity to take an active role in global interaction.

One issue that each educator must face is the media coverage of the negative side of the Internet. The summary for

the week made the statement that this security is more of a perceptual problem than a real problem to the extent that parents and school boards worry about the extreme cases. The general agreement is that the media is capitalizing on the negative when in fact they could be citing many examples of the positive aspects. For instance, G. Fields from a Calgary school where the students made a pipe bomb was appalled at the headline in the paper blaming the Internet. "Kids have been doing this for years and you never saw that they were getting their information from the encyclopedias or the Public Library." All respondents keep a very close eye on what the students are doing on the Internet. Supervision is the key to making sure that we do not become the headline. Many schools with an acceptable use policy have it signed by the students and their parents. It is a comprehensive document with the bottom line that if one does abuse the privilege it will be lost (see Appendix VII, Section 3, p. 221).

One of the key points that was addressed was the lack of time educators have to learn how to use this tool. Various strategies were suggested. The most common was to have a site based expert available to help teachers as they experiment. Many reported that they were the only staff member utilizing the tool. I believe this will change to a degree in time. It has to be easier and more accessible before others will try. We need to have the pioneers who are willing to jump in and start. If more reluctant users become involved before many of the faults are ironed out, they run the risk of being frustrated and quitting. Along with that they would probably be very negative and discourage others

from becoming involved.

2. Telecommunication Projects

The paper, "Learning Well... Living Well," was prepared by the Government of Canada to discuss "how our approach to learning can be improved to ensure that Canadians can continue to enjoy the benefits of a globally competitive economy in the 21st century" (Alberta Education, 1992, p. 29). One of its recommendations was to "prepare students with the tools needed for lifelong learning in a high-tech, globally interdependent world" (p. 29). In my opinion, one of the most exciting aspects of incorporating telecommunications into the curriculum is the potential it holds for students to communicate with their peers around the world to discuss various issues that have a global impact. This will alert them to the interconnectedness of our activities. We may be thousands of miles away from the root of the "problem" but it will still have an impact on us. The same is true in reverse; our actions in Canada will affect people on the other side of the world. Many of the environmental concerns such as acid rain, ozone depletion, and destruction of the rain forest are discussed in classes now and we speculate on the effect it is having around the world. This is very abstract for adolescents. Being able to discuss it with a child in any other country will have a far greater influence on their learning. It will provide them the opportunity to develop an "[appreciation] of the relationship among science, technology and society" (p. 11) as stated in the "Goals and Objectives of Senior High School" (Alberta Education, 1994).

An example of this interaction is recounted by the California Department of Education, K-12 Network Planning Guide. In 1993, riots broke

out in many areas of Los Angeles. Students linked by Internet in the Bay area and in Los Angeles were able to take part in a personal dialogue and discuss what it is like to be a child so close to the rioting. This gives the student the opportunity to decide what is important to them and not rely solely on the coverage deemed important by the media. "Teachers in these classrooms took this opportunity to lead students into ongoing dialogues about social history, racism, criminal justice, and even regional economic development" (K-12 Network Planning Guide, 1994).

A similar account is provided by Rachel Weston a seventh grade student at Georgetown Day School in Washington, D. C. in her essay entitled "Networks: Where Have You Been All My Life":

> As I flipped through my e-mail messages one morning I suddenly received a new one entitled "The Sydney Bush Fires." The mail was from my Australian keypal, and he was telling me and some of his other keypals what it was like to be experiencing the bush fires that were burning all round Sydney. Forgetting all about my other messages for the time being, I quickly wrote back and arranged to go with him to the KIDLINK IRC (Internet Relay Chat). On IRC, a place where, amazingly, people can talk back and forth, I was able to ask my friend all about the disaster. It turned out he was less than ten kilometers from the fires, he could see the flame-tinged sky and smell the smoke from his window, and he was able to tell me how far the fires were from the famous Opera House and the Taronga Park Zoo. During the next several days I communicated through e-mail several times more with my Sydney friend, and the fires got even closer to his house. Ultimately he was safe. However, all week long the information about the Sydney fires that I brought to current events in my social studies class was more up to date than anything in the newspapers.

Rachel won the grade 7-9 category of an essay contest sponsored by the National Center for Education Statistics, the NASA K-12 Internet Project, and the National Science Foundation in 1994 in which students were to describe their most significant learning experience on the Internet.

Through this kind of interaction, learners in networked classrooms

> quickly discover the energy and joy of learning collaboratively with others worldwide. Student curiosity and motivation increase when learning is linked to real-world problem-solving. . . . The teaching of skills such as critical thinking and teamwork, . . . is greatly supported by the participatory nature of the Internet. Many teachers find that their students develop a much greater interest in diverse perspectives as a result of their Internet interactions (K-12 Network Planning Guide, 1994).

"Computers permit teachers to create functional learning environments where students deal with "real life" problems rather than responding to textbook chapters as the content of instruction" (Rockman, 1993, p. 31). Bruder (1993) refers to a project initiated by Bruce Seiger that utilizes telecommunications in the classroom. Seiger's science class in Massachusetts was linked to students around the world via the Global Lab network. He knows that the students could have done their environmental experiment locally but has observed an increase in the students' interest in understanding the issues now that they are sharing their results with students in other locations (p. 21). This has bridged the gap between finding the results in a specific instance and then analyzing and comparing them so that general conclusions can be drawn.

Wireless Coyote is another example of an innovative project that was implemented by teachers in the classroom with the support of Apple Computer. The students in the classroom participated in a field study of a waterway in their area. They established many stations that were networked to each other as well as to a base camp and the classroom. The students used high tech instrumentation to collect the data and enter it into the computer at the site. This information was relayed to all other sites immediately. The students were able to graph the data on the computer so that they could look for patterns and idiosyncrasies. The groups would identify a follow up

question that they would attempt to answer and ask other groups to do the same. The groups worked cooperatively to gain an understanding of the whole area. The objective of the program was to provide students with an authentic science experience. On the spot analysis and discussion deepened the understanding and allowed the opportunity for the students to formulate hypotheses for further testing. In this scenario the students were active, social, exposed to variety and able to see the relevance of what they were doing because the task was linked to the real world. This breaks the boundaries of the traditional classroom in which the teacher regards knowledge as a set of abstract information that must be transmitted to the passive recipient by means of reading and doing exercises that are not related to real life situations (Ossman, 1990). The video documenting this project is an excellent example, which can be readily used in the classroom to demonstrate, a learning opportunity that allowed students to operate as real scientists.

Educators in Nebraska were involved in a project similar to the asthma study. Students were networking with their peers and then sharing their results with the experts in the field. The project involved the local students collecting data and monitoring the wetlands. They then contacted other schools to compare their findings with their peers in other states. The students proceeded to contact the Environmental Protection Agency (EPA) with their results. The results were very useful to the EPA because they did not have the resources to monitor the wetlands on such a wide scale. This made the learning very real for the students (Solomen, 1994, p. 20). It is very rewarding for the students to know that the information they gathered would be used by professionals.

To be effective telecommunication based projects should involve

collecting data from large groups or from dispersed locations. This will encourage schools to collaborate with one another to meet their research objectives. The projects combine hands-on activities, collaboration and the sharing of ideas and results. The success of a telecommunications project lies in providing a reason for peers to communicate. "Without a purpose, communications are not sustained" (Roberts, 1990, p. 125).

According to Judy Harris (Way of the Ferret, 1994) there are three main categories of telecommunications projects: person-to-person exchanges, information collections and problem-solving projects. The most popular of these is the person to person exchanges. Most often these exchanges take place via e-mail in the form of keypals. Groups of students can also communicate through newsgroups and Internet connected bulletin boards (p. 118). These projects often focus on learning about one another's cultures, home and way of life. They could serve as a forum for discussing an environmental issue that two classes on opposite sides of the world are studying. "Global Classroom projects often address current issues and problems for which there are, as yet, no solutions" (Harris, 1994, p. 123).

The second category, information collections, may involve students in collecting, compiling and comparing different types of interesting information. For a grade eight science class, this would be an innovative way to collect biome data. Students can then create their own databases within the school that can be added to by others and updated on a yearly basis. Students could also collect information about environmental issues globally and then publish them in an electronic newspaper. The articles could be submitted by students from around the world or written from our perspective with the intent that others read them and share their opinions with us. Often the factors we see as problems or concerns may not be shared by others.

Providing students with the opportunity to view the problem from many perspectives would provide an opportunity for them to develop critical thinking skills. They must also assess the source of the information to determine its validity.

This category would also include telefieldtrips. The reality of cutbacks is that we can no longer afford field trips. Now we can share our local field trips with other schools that cannot make the trip. Students are encouraged to document their field trips and share their findings on the Internet. Schools with access to posting on the World Wide Web could create a virtual tour using text, sound and graphics (see Appendix V, p. 190).

The asthma study falls in the category of pooled data analysis. "Information exchanges are particularly powerful when data are collected at multiple sites, then combined for numeric and/or pattern analysis" (Harris, 1994, p. 141). An example of this type of project is the Stream Acidity Study conducted by Ken Hignell's science class at Guildford Park Secondary School, Surrey, British Columbia, in 1994.

> The purpose of this project is to produce descriptive data on the acidity of local streams. Samples will be collected and measured in as many streams as possible. In analyzing the data, students should be able to describe the extent of the acid problem and compare individual streams and regions. The data can also be used as a baseline for future study. Successful involvement in the project will be reflected in the preparation of student research reports which are consistent with the database generated. The research report will itself reflect the higher order thinking skills of critical analysis, evaluation, and synthesis of information that is involved in interpreting the data (SchoolNet-projects).

Mr. Hignell believes that his project has met the requirements that he has outlined as essential for a successful telecommunications activity. The stream acidity study will:

1) integrate well with ongoing science activities in the classroom;

2) draw upon phenomena which are common across locations;
3) involve phenomena where the observed differences are measurable;
4) require measurements which are fairly simple to make;
5) involve data which are not otherwise easily attainable;
6) possess activities which can be conducted offline;
7) involve students at all stages, and not just as collectors of data (Hignell, 1994).

"Educational Problem-Solving projects are, as yet, the least common kind of Internet-based activity that involves precollege students, but they are among the best examples of how asynchronous connectivity can be used to support and enrich precollege curricula" (Harris, 1994, p. 143). An example of this type of project would be to involve many classes in a science experiment and then compare the results. To be effective the students must ensure that all variables are defined and that the experimental procedure is carefully detailed. Any discrepancies in the results would then form the basis of further communication while the students form hypotheses of what may have been different and then verify it. In some cases discrepancies may be expected due to altitude, humidity and other environmental factors. This is also a valuable learning experience in that they will then realize that there are a number of variables they cannot control that will affect the outcome of an experiment.

The possibilities for telecommunications projects are endless. It is extremely important to remember that the project must be driven by the curriculum. In all likelihood the students will be so involved in the project that the telecommunications tools will no longer be the focus but a means to reach their goal.

The provincial and federal governments have made their expectations very clear. Their sponsorship of SchoolNet has provided us with an opportunity to work toward these goals. They have told us what is expected

and have provided us with a tool and now it is up to individuals and schools to find away to amalgamate the two.

3. The Role of Telecommunications in Conducting Research

One of the most used features of the networks is electronic mail (e-mail). E-mail has revolutionized communication by speeding up the sending and receiving of information globally. "Sending correspondence via e-mail can be more productive than trying to get someone over the phone, because mail is held for retrieval until the user logs on" (Roempler and Warren, 1993). People can receive mail at the speed of electricity save it to their computer and then reply at their leisure. One has time to think and prepare an answer before replying. This has incredible possibilities for research to be conducted on a global scale. "With the growth of online networks, around the world, it is feasible to see an increase in the use of E-mail survey research" (Thach, 1995, p. 27). This holds true for schools as well. As more and more schools are linked via SchoolNet, the opportunities for students to share information will increase drastically. We no longer have to rely on text book statistics but we can now validate these statistics through our own research and then seek reasons straight from the source. We can provide our students with the opportunity to make the research meaningful to them by having them ask the questions to find out the answers they need or want to know.

The speed and flexibility of electronic mail increase its usefulness to the classroom teacher. Unlike the phone, electronic mail can be used at any time of day or night. This is very useful for educators who have very busy schedules during the day and may not have easy access to a phone line or in particular a long distance line. Mary Yates and Susan Hubbard have prepared

a lesson plan entitled "Getting the Most Miles out of Telecommunications" (1994) which they posted to Internet. The rationale for their lesson states:

> in our information age the prime way that data will be collected, analyzed, and shared with our workmates will be through the media of telecommunications. As our reliance on up to the minute data grows in importance in the workplace the ability to use telecommunications as a medium will be an even more important workskill (Yates and Hubbard, 1994).

Thach (1995) has described four reasons that electronic mail is an ideal means of communication. Messages can be sent and received within a very short time frame. The receiver can respond when they are ready and then send it back immediately. Many messages can be passed within one day. Part of the speed of this process over the regular mail system is that there are no intermediaries. The communication takes place from one computer to the next. No one needs to sort the mail and redirect it. Once the communication has been completed the messages can be deleted without a trace (p. 28). These later two "advantages" must be monitored by the classroom teacher. These characteristics are important in a business world, but in the classroom, however there are serious ramifications of allowing students this type of Internet and e-mail access. Many of the groups set up on the Internet for student access depend on the fact that teachers must supervise what is being shared. Some students may take advantage of the anonymity by sending inappropriate materials to other schools. This may or may not be done without realizing the effect that it could have on this type of program. If students had this type of access they could slow down the system drastically by sending and receiving a large amount of mail that the computer servers cannot handle. A primary advantage for SchoolNet pilot schools is that e-mail is far cheaper than the regular mail system (snail mail, as it is referred to by most e-mail users). With free Internet access we incur no cost for sending

mail via the network.

Another advantage of using electronic mail for posting and receiving survey responses is the fact that the information does not have to be retyped, just edited. The researchers can save a copy of the data and then reorganize it and analyze it as necessary (Thach, 1995, p. 29). The ability to manipulate data in this way would also reduce the errors that are inevitable when reentering data.

When conducting e-mail research it is advisable for the researcher to extend an invitation to participate to the group they wish to survey in advance. This serves two purposes. One it provides the researcher with early feedback on the number of participants and allows the opportunity to expand the target group if necessary. Secondly, it builds a commitment from the participants. "If the user agrees to participate, they are much more likely to actually follow through and complete the questionnaire" (Thach, 1995, p. 29).

Kiesler and Sproull (1986) found that there is a twenty percent higher response rate when using e-mail surveys over hard copy. Face to face surveys still have a higher return rate. Their second finding was that the respondents to the electronic survey made fewer mistakes, left fewer questions blank and refused to answer fewer questions than did the paper survey participants (p. 410). This may be due to the fact it is easier to make corrections on a computer or it may be a reflection of the education level of the computer owners and users.

Electronic mail does have many advantages but along with these there are some disadvantages. Surveyors must make it very clear that it is very difficult to maintain confidentiality and anonymity when corresponding over a network. Another concern is, as Thach (1995) explains, that the survey sample is limited to those with a computer and online access. In 1986, when

Keisler and Sproull conducted their research they found that the groups with access to computers are generally well-educated, white collar, technology literate, urban residents (p. 411). This may exclude students from lower socioeconomic backgrounds as well as remote school districts. Hopefully, SchoolNet access would remove this barrier for us by reaching their goal of linking all Canadian schools. Keisler and Sproull (1986) also found that people are more apt to provide "socially undesirable responses" to the electronic survey than the paper and pencil survey. They have related this to their previous research that indicates people communicating via computers are more apt to be "self-absorbed and uninhibited" (p. 411). This finding reinforces the idea that teachers must closely monitor what the students are accessing and sending on the computer. Mail should not be sent unless it has been approved.

E-mail surveys are more difficult to design than a paper survey. It does take practice and skill to produce a survey using electronic formatting. The way it looks on your computer does not necessarily indicate how it will look on the receiving end. Time must be spent learning how to use electronic mail effectively and efficiently. As with all technology there are the inherent hardware and software problems that are often beyond the user's control.

The advantages of students using e-mail to collect data far out weigh the disadvantages. Teachers and students are constantly working within very rigid time constraints. E-mail research is definitely a viable alternative for receiving information quickly from schools, businesses and experts world wide.

4. Action Research

For this study I am using the research methodology of action research to study the process of integrating telecommunications into the grade eight science curriculum. The vehicle I am using to do this study is the grade eight students' collaborative project on asthma. A considerable body of research (Carr and Kemmis (1986), Elliot (1986), Coutre (1989), and May (1993)) has been documented and has provided leadership in conducting this type of research.

Action research is a phrase coined by Kurt Lewin to reflect the process of planning, fact-finding and execution (Carr and Kemmis, 1986, p. 162). Carr and Kemmis (1986) define action research as "a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out" (p. 162). The two primary aims of action research are "to *improve* and *involve*" (p. 165).

According to Elliott (1991) action research was employed as a response to the school-based curriculum reforms in the secondary modern schools in England in the 1960s (p. 3). The need for reform arose out of the students' and parents' rebellion against the curriculum that was in place. They felt that much of it was irrelevant to their lives. As a result the teachers had the choice of forcing this curriculum on the students or adjusting the curriculum so that it was more "intrinsically interesting" for the students (p. 4). They chose to provide a curriculum that would enable the "students to make connections between the subject-matter and their everyday experience" (p. 5). What they soon discovered was that one could no longer make distinctions

between the subjects. What happened in one subject would carry over to the next. The students needed to use their knowledge of one subject in relation to another to be able to examine the issues. The teachers needed to rely on each others expertise which led them to create "integrated studies" (p. 5). Carr and Kemmis (1991) state that:

> implicit in this school-based curriculum-reform movement were newly emergent conceptions of learning, teaching and evaluation which were explicated in justificatory discourse as the innovatory teachers attempted to negotiate collaborative activities with each other, and to justify them to their more traditionalist colleagues in staff rooms (p. 5).

Theory and practice are not separate entities but co-evolve. According to Elliott (1991):

> all too often research is viewed as something teachers now do on their practice. They step out of their pedagogical role. Teaching and research become posited as separate activities, whereas from the standpoint of the practitioner reflection and action are simply two aspects of a single process (p. 14).

Elliott (1991) believes that action research is initiated by teachers in response to a situation that they feel needs to be examined. The innovations that are proposed will lead to controversy among some members of the staff because they challenge their accepted beliefs about teaching, learning and evaluation (p. 9).

According to May (1993) "action research is the study and enhancement of one's own practice" (p. 116). The purpose of action research is to monitor and improve educational practice. It provides the "opportunity to plan and design, to be involved in a critical manner" (Coutre, 1989, p. 75). Elliott (1991) states that "the fundamental aim of action research is to improve practice rather than to produce knowledge" (p. 49). I believe this last statement by Elliot to be contradictory because I do not think that

improvement of practice and knowledge can be separated. In the process of action research the researchers are examining their practice and analyzing it. This will generate new knowledge about their practice which should be used to modify what they are doing if necessary. Knowledge and practice are not exclusive.

Many teachers would believe that theory is developed by academics without them having had experience in the classroom. The theories are often rejected as invalid for this reason. "To bow to a 'theory' is to deny the validity of one's own experience-based professional craft knowledge" (Elliott, 1991, p. 46). Elliott (1991) supports the idea that the practitioners must be involved in the research.

> (A)ction-research might be defined as *'the Study of a social situation with a view to improving the quality of action within it.'* It aims to feed practical judgment in concrete situations, and the validity of the 'theories' or hypotheses it generates depends not so much on 'scientific' tests of truth, as on their usefulness in helping people to act more intelligently and skilfully.... In action-research 'theories' are not validated independently and then applied to practice. They are validated through practice (p. 69).

Action research is a means for bridging the gap between past practices and the future. The action aspect is dynamic and shows the practitioner at work. The observations will document the effects of the action and provide the basis for the necessary critical self-reflection. The reflection looks back to the observation to identify the problems. The discussion will lead to the development of a plan for improvement. I do appreciate that it is a method for a teacher to be in the environment, actively participating, monitoring, adapting, reflecting, planning and replanning to fit the learning.

Dyrli and Kinnaman (1994) strongly support the role of the classroom teacher in the integration of technology into the classroom:

(t)echnology provides education options that never existed before, but

> technology itself does not care about epistemology or pedagogy. It will serve whoever controls it . . . [I]f technology powered change is to result in school improvement, teachers, more than anyone else, must participate actively in defining what should be done educationally with technology. Yes, it requires a significant personal investment, and yes, it is likely to include frustrating obstacles. But it must be done-the future of education depends on it (p. 50).

Action research as defined by Elliot, Coutre and May has provided the structure to implement this study on utilizing telecommunications in the science curriculum. A classroom teacher is actively involved in examining the changing role of educators as a result of making use of technology in the curriculum. The technology was used as a tool to enhance the curriculum not as an add on to what is currently being done.

CHAPTER III

PROCEDURE AND DESIGN OF THE STUDY

1. Methodology

1.1 Application of Action Research

I chose to explore the use of telecommunication as a tool to enhance the grade eight science curriculum by way of action research. This orientation was appropriate for a number of reasons.

I was actively involved in the process as teacher and researcher. I developed a plan to incorporate telecommunications into the science curriculum; implemented the plan in my classroom; evaluated the strengths and weaknesses of the plan; and modified the plan as necessary. The process would then start again. I was correct in assuming that I would not follow these steps in a linear fashion but would move back and forth between them as I deemed necessary.

Throughout the study I was aware of how my lesson and unit planning were modified so that I could incorporate the technology into the study of science. The key is to be very flexible and prepared with a back up plan because I have learned that one cannot always count on the technology to work when the class is prepared. This was a very frustrating major obstacle that was out of my control and could be extremely destructive if it was not anticipated. The flexibility is also important when ensuring that the project does fit the needs of the students. As I received their feedback I had to be prepared to adapt the lessons to cover what we perceived as necessary. As the students encountered problems, it was essential to address them. It was also

necessary to take the time for students to share what they have learned with their peers. Exploring these learnings as a class created a climate of shared responsibility and learning. It is also reaffirming for the students to know that what they have learned is valuable and worthwhile. These very important factors had to be incorporated into the study.

The students I was collaborating with had a stake in this project. Their input was vital to the success of the study. The project was evaluated and modified depending on their success, questions, and interests. We did not have one strict plan which we had to adhere to. We were learning as we went and our path of exploration was modified depending on the progress we had made each step of the way. It was a dynamic process. Ideally, I would have liked the students and I to have worked in a true democracy were the students and I could share in the decision making. It was virtually impossible for me to conduct the study in that manner. I was ultimately in control of the skills and content which the students had to cover as mandated by Alberta Education, as well I had to accept the majority of responsibility and ownership for researching the process. Some groups had naive or impossible ideas to implement such as finding out how illegal drugs and smoking affected asthmatics. I then had to explain to them why I would not approve the topic. I wanted each group to experience success so I retained the right to have final say. Discussion had to take place to achieve consensus or compromise in some cases.

In the research, I found many exciting ideas and projects (Wireless Coyote, Wetlands Study, AT & T and Global Lab) that have been tried but have been unable to locate an account of the process that

the teachers underwent to implement the change. The pedagogical process also needs to be documented so that other teachers can refer to it as a guide when they are ready to try their own project. Therefore, I am using my practice to simultaneously document what worked for me. I predict that some generalizations can be made. However, each situation will be unique depending on teacher expertise, amount of equipment, financial backing and support within the school and district.

1.2 Data Collection and Interpretation

1.2.1 Qualitative Data

1.2.1.1 Student Journals

The students were required to keep a journal for science. The journal was to be used as a tool for organizing their research, storing data, and recording their findings, conclusions and learning throughout the program not just for the asthma study. I felt it was necessary that it be a comprehensive journal because I did not want them to view the asthma study as separate from science. Since my goal was for the students to make the connection that science is all around them, they had to view this as another way to learn about science. I could not separate it from their other studies. I also did not want it viewed as something that I will be reading only to evaluate the project. Van Manen (1990) reports that "teachers have found that practising diary writing with students may contribute to the learning process as the students are encouraged to continue reflecting on their learning experiences and to try discovering

relationships that they might otherwise not see" (p. 73). I directed the journal writing with a series of two to four questions until the last entry to make sure that they understood what was expected. I had intended for them to keep a record of their progress and contacts made during the asthma study so that we could keep track of what had been done and what was left to do. The nature of the project made it impossible to work on it every day until it was done. Unless the students document their work in their journal when we returned to the project many of them would have forgotten who they had written to and the questions asked. Group dynamics were addressed in the questions so that I could monitor if the group was working cooperatively in sharing the workload and allowing everyone to contribute ideas. They were also asked to discuss their frustrations with the project as well as their highlights. Since a journal may be highly personal in content the students have the final say on what I can disclose of its contents (Elliott, 1991, p. 77). The students and their parents completed letters of consent early in September knowing that in June they could look back over the journal and remove anything they did not want disclosed or change their minds about having their journal used at all (see Appendix II, Sections 5 and 6, p. 171).

I periodically collected the journals so that I could respond to their concerns and questions, provide positive feedback for their progress, identify any areas that we needed to address as a class and modifications that were necessary to the project. I felt it was important to discuss some of the issues that arose in the

journals such as team work and collaboration, as a class. I needed to identify dysfunctional groups early in the year. In dysfunctional groups one or two members would monopolize the computers rather than listen to everyone's ideas and reach a consensus. I could not allow a situation to arise in which one or two group members were alienated because this project was going to take the better part of the school year.

In my own journal, I documented student concerns, thoughts and suggestions which they shared with me in their journals.

1.2.1.2 Teacher/Researcher Journal

My journal had two interconnected components. I documented the process and development of the student research as well as the value of using telecommunications. As I began to collect the data it was impossible to separate the two objectives. What I did and what the students did are directly related. Therefore, the two sources of journals were imperative for the comparison of experiences. Following Elliott's (1991) advice my journal does:

> not merely report the 'bald facts' of the situation, but convey[s] a feeling of what it was like to be there participating in it. Anecdotes; near-verbatim accounts of conversations and verbal exchanges' introspective accounts of one's feelings, attitudes, motives, understandings in reacting to things, events, circumstances, these all help one to reconstruct what it was like at the time (p. 77).

This form of journal writing is "very helpful for keeping a record of insights gained, for discerning patterns of the work in

progress, for reflecting on previous reflections, for making the activities of research themselves topics for study, and so forth" (van Manen, 1990, p. 73).

According to van Manen (1990), once the data is collected the researcher will return to the data to look for the "emerging themes." "Sometimes the best anecdotes are re-collected as one tries to make sense of things that somehow seem interesting now, in hindsight" (p. 69). It was very important to go back and recover the conversation and occurrences that surrounded the significant event.

The notes which I recorded, documented what was happening during class time as well as the times that students came in on their own time to work. The difficulty here was, as I expected, in finding the time during the day to keep a record. It has been my experience that I do not have the time to sit down and document while the students are working. I need to be available to help them. When reviewing my journal I needed to be aware of any bias that was evident in what I chose to write down when I had the opportunity.

The time spent working with the students outside of class provided me an opportunity to talk with the students on an informal basis and as a result make observations that are incidental and probably more informative. Having had the experience of working on the asthma study the previous year with another group of grade eights I had gained a better perspective on what types of information I was looking for as well as things that I could expect.

According to van Manen (1990) uncovering the themes is not as unambiguous and mechanical as some would believe. "Making something of a text or of a lived experience by interpreting its meaning is more accurately a process of insightful invention, discovery or disclosure-grasping and formulating a thematic understanding is not a rule-bound process but a free act of 'seeing meaning'" (pp. 78-79). Such was true in this case. The recurring themes provided me with the information I needed to develop recommendations and conclusions.

At the same time I attempted to maintain an awareness of the collaboration between myself, the students and the medical researchers. This was not without stress because we each had our own agenda which was not exclusive of the others needs, however we did prioritize differently. My main objective was to ensure that it was a worthwhile experience for the students. The Alberta Asthma Centre was most concerned with collecting statistics and information which could be used for their own research. There were times when these two needs conflicted with one another.

The data did have a varied format. In preparing the discussion I looked for themes that would help me determine the growth which the students and myself have experienced as a result of the project. I agree with Elliott (1991) that the data interpretation should occur throughout the project. As the data was analyzed I recorded my interpretations, new hypotheses, emerging problems, suggestions for improvement and alternate

activities.

To interpret the data I attempted to use the idea of triangulation recommended by Elliott (1991) to compare and contrast the data collected from a variety of sources so that the points of agreement and disagreement for all participating groups would be considered (pp. 82-83). During 1993-94, our first year involved in SchoolNet, many things did occur that I did not expect; some of them were pleasantly surprising (see Appendix I, Section 2, p. 138).

An example of this was the turn around on who was using the computer. In the initial phases of the project, boys dominated the scene. A couple of weeks into the project it was more of an even split between the boys and girls. I was amazed at the confidence gained by the girls. A large number of students took the initiative to come in early, work at lunch and stay after school so that they could get more time working on the computers. It almost seemed like too much fun to be science. Other students who were not in the classes were very curious about what we were doing and asked many questions. This was an incredible boost and feeling of importance for those involved.

The two sources of journals, the students' and my own, allowed me to compare and contrast my experiences with those of the students (Elliott, 1991, p. 77). It was very important that I monitored this progress so that I could identify problems early instead of finding out too late, causing a lot of frustration for the students. I anticipated that this would be a necessary step if we were not receiving the response we needed. Early in the project

it was impossible to predict the situations that would arise. I had to ensure the necessary flexibility to incorporate student suggestions, needs and problems.

Using the information gathered from the journals I could evaluate the success of the program in terms of the perceived benefits it was providing the students. The journal entries were used in conjunction with the quantitative data to form the conclusions for the study. I could also use the journal data to identify a process which could be used by other teachers who wish to implement their own telecommunications project.

1.2.1.3 Discussion/Interviews

It was necessary for there to be an ongoing discussion between the students and myself so that I could learn what they were gaining from the experience. I wanted to know if doing real science was rewarding for them. In the initial stages of a study, Elliott (1991) believes that the interview should be unstructured so that the researcher can remain open to finding out what type of information is pertinent (p. 80). The conversations we had were very informal so that the students would be more candid instead of trying to say what they thought I wanted to hear. It has been my experience that students will be more open if you are discussing a topic while working together instead of sitting down with a pen and paper asking predetermined questions.

1.2.1.4 Focus Group

A considerable body of the literature on action research (Carr and Kemmis (1986), Elliott (1989), Ripley and Hart (1989),

Thiessen (1989)) discusses the importance of collaboration to the process. According to Elliott (1991) a teacher who isolates themselves during the reflection phase will alter the impact of action research so that they are simply improving their "technical skills." They would also come to believe that their ability to make change is impossible (p. 55). I agree with Elliot knowing the obstacles faced when bringing technology into the classroom. A single teacher trying to make these changes will become very frustrated because there will be negative feedback from colleagues. It is imperative to have a support system in place to discuss the merits and drawbacks of the proposed changes so that you can remain realistic and understand and prepare for the reluctance of others to become involved.

For this project I did not have the advantage of working with colleagues within my school. However, three other middle schools and the two high schools within the district were also involved in the SchoolNet Pilot Project. I was able to serve as a resource person for them in the initial stages to help them get their own connection operating and to show them how to navigate the world wide web using Mosaic/Netscape (see Appendix VII, p. 211). Four of these schools were first year Internet users. Due to the unexpected delay in e-mail access they did not continue with their planned collaborative projects. This was unfortunate from my perspective because it limited the people close by with whom I could collaborate. The most important aspect of the collaboration was my work with the students. I was continually receiving input from the students as

they did their work. I used their feedback to adjust the project to fit their needs.

Fortunately I was able to use the Internet itself as a source of collaboration. According to Roberts (1990) "telecommunications can decrease the isolation of teachers, bringing them into contact with other teachers, educators, and professional scientists and engineers" (p. 118). This is essential because teachers are unique in that they are isolated in their classrooms and have difficulty obtaining support from their peers and the resources that they require to be effective. "Several projects in science education are developing ways to use telecommunications to break down this isolation by facilitating teacher-to-teacher interactions within a single school and among geographically dispersed schools" (p. 119). SchoolNet is a valuable source of networking opportunities for teachers involved in conducting their school projects. It was my experience that teachers on the network were very helpful. When one finally figures something out is exciting and there should be an audience to share it with.

In keeping with the philosophy of the Internet in creating a global community for teachers to communicate with their colleagues, I joined a SchoolNet focus group that was established to discuss the issues surrounding the use of Internet in the classroom. This type of discussion provided me the opportunity to focus my thoughts as well as to receive input from others so that I could learn if my experiences were unique or shared by other Internet users. This group discussed issues for the last six

weeks of the school year. I kept a record of the responses from all participants and then examined them for common themes and experiences.

While doing this research, I found that it was imperative to have a support group. The research is my own. I am working with the students in my grade 8 science classes. I have a specific goal in mind. However, to reach this goal it was necessary to receive input from the people we were collaborating with outside of the school system. The Alberta Asthma Centre, Glaxo Canada Incorporated and I needed to be in constant contact to discuss the meeting of our individual goals. I had anticipated that we would be working towards a final goal and as a result the participants would form the basis of the support group. Unfortunately, as much as I tried to contact Glaxo my calls were not returned and I was put in the position of waiting for the Alberta Asthma Centre to take care of establishing contact and making arrangements for us. This was very frustrating and unproductive and I would highly recommend avoiding this type of situation. If at all possible the support group should be established with peers who are interested in similar projects and changes. Teachers are in a unique situation and cannot expect business people to provide the foundation that is necessary.

1.2.2 Quantitative Data

I administered three pre- and post- surveys that were used to assess attitudinal changes in the students regarding their views on the use and role of computers in our society and the value of science and technology to society (see Appendix II, p.

164). The surveys I selected had been tested and the validity had been measured by previous researchers (Erickson, Touchings, Nay, Gay, Mrazek, Bateson) when studying changes in attitudes as a result of implementing new teaching strategies into the Alberta Education curriculum. The intent of the surveys was to more objectively measure whether or not the students became more aware of how science is relevant to their everyday lives and the idea that with careful planning we can use science and technology to assist us in examining societal issues with the aim of providing a viable solution.

My first task in September was to identify the individual student's perceived ability in working on the Macintosh. The students were asked to complete a survey in which they rated their own ability as well as letting me know the technology they had had experience with. Using this information, I attempted to ensure that the groups I established were heterogeneous with regards to computer expertise. Each group had the challenge of ensuring that group members had time on the computer and that they help each other learn the necessary skills. From my past experience, I know that those who are comfortable on the computer will often attempt to monopolize it. I had to be very aware of those who were using the computer to make sure that everyone was receiving the opportunity to learn. This project was carried out over several months which gave many of the students the opportunity to increase their computer literacy.

I also wanted to know how many students had access to a modem at home that they were using to contact other people. It

was important that I acquired this information immediately so that I could ensure that these students did not dominate the computers. I felt that it would be very useful for me to set up our project so that the computer literate students could act as resource people for other students experiencing difficulty. Some of the students could choose to do some of their work at home if they had the programs there that they wanted to use for their presentation.

1.2.3 End Product

Waugh (1994) feels that one indicator of success of a telecommunications project is the degree to which it completes the life-cycle. The stages of the life cycle are proposal, refinement, organization, pursuit, wrap up and publication. Having completed the life cycle does not necessarily indicate that the project was a success but having carried out the steps does denote some degree of success (p. 22). I had intended for the students to complete this cycle with the asthma study. Waugh's steps coincide with the method of conducting a research project that I had selected.

It was my intent that each group would summarize their findings in a multimedia presentation that included the elements of a research paper presented in a more creative way. I had planned to have the students incorporate their findings in written form as well as tables and graphs. They could also scan pictures into the computer, take photographs using the digitizing camera and record their own voices or an experts opinion. Their final product was to be sent to the Alberta

Asthma Centre to be checked for accuracy and them distributed to the participating schools. We had intended to prepare an information package that will teach about asthma to individuals, small groups or whole classes at one time. A great deal can be learned about the project by viewing the end product. The quality of the data analysis and conclusions will help me determine the projects success.

The end product from the thesis research is the documentation and recommendations for conducting a collaborative project over the Internet with students as well as an information package to help teachers get online once they have Internet access.

2. Implementation of Action Plan

John Elliott (1991) has outlined a practical guide that can be followed when using action research. I believe this model, as outlined in sections 2.1 to 2.5, was appropriate to guide me through the process because the model emphasizes the necessity of understanding the problem, specifically, the integration of telecommunications into the science curriculum, before getting involved and the fact that this research is not static. It is important to continually access the progress and outcomes so that any modifications to the problem are identified.

2.1 Identify and Clarify the Problem

In this study the problem was that I felt the science curriculum was not preparing students for their future. There is a wide variety of

current information available that will help students create a connection between the world around them and science. Making this connection will help them realize that they are able to find and interpret the information that is required to make sound decisions. The action that is required in this particular case is to alter the program resources and teaching strategies to provide the students the opportunity to access a wide variety of information using telecommunications.

2.2 Reconnaissance

2.2.1 Describing the facts of the situation

The facts that I based this study on are firstly, many of the current issues demand scientific literacy so that our young people can make valid decisions based on an understanding of the long and short term implications. Secondly, science textbooks create the illusion that science is predictable and predetermined. Lastly, there is an exponential growth in the information available to us.

2.2.2 Explaining the facts of the situation

I felt that I was relying on the textbook to the point that students saw it as the source of science. Many of the activities we were doing are designed to teach a method of performing science but the actual activity is often irrelevant to their lives. As well, when we attempt to get through the curriculum I found I would often neglect to discuss current issues because of time constraints. This removes science from our lives and places it into a textbook that becomes outdated very fast. At the same

time we are facing an exponential growth in the information base and as educators it is impossible to keep up. As educators we must be willing to accept the fact that we no longer have all the answers. We do have the skills to find the answers to questions and to verify the validity of information brought into the classroom. It is crucial that our students learn the skills that are necessary to determine the facts regarding a scientific issue. I planned to show that the scientific process can be used to gather information regarding a real life issue.

2.3 Constructing a General Plan

In the application of action research there must be the flexibility built in to allow the researcher to evaluate the progress being made and to accommodate any unforeseen problems. When I started this project I was only able to anticipate the initial steps as I have outlined here due to the fact that many factors were beyond my control and had to be examined as they arose. In the beginning, I could not determine the date we would have e-mail and Internet access nor could I know how many schools would be working with us. The initial plan was developed and carried out assuming that each of these would fall into place.

To ensure that the telecommunications project was a success I had to emphasize to the students the importance of conducting the asthma study and their role in providing useful data to the researchers. It was important to find a speaker who could relate issues in their lives to science and who could emphasize that there remains many unanswered questions related to asthma. Mrs. Colleen McPhee from

the Alberta Lung Association proved to be an invaluable resource to our class. Early in September she came to speak to the classes about asthma and the seriousness of the illness. Mrs. McPhee is very active in setting up programs for children and their parents to help them control their asthma. She related many of her own experiences with her own and her children's asthma to the students which added credibility to the facts she was presenting. Mrs. McPhee discussed the many types of asthma, treatments, symptoms, and the important role that education plays in getting asthma under control. The main point of the presentation was that with proper knowledge a person can control their asthma and avoid their triggers so that they can avoid life threatening situations. Mrs. McPhee made it very clear that the researchers have many unanswered questions regarding asthma and that the research these students were about to do could provide very valuable information to the Alberta Asthma Centre. Dr. Hessel from the Alberta Asthma Centre followed up this visit on October 15, 1994. He spoke to the students about asthma and conducting research. He provided many examples to make it clear to the students how validity could be affected and that the wording of the questions is crucial if one wishes to receive usable data.

The first step for the students to become actively involved was completing their background research. It was very important to me that the students did not restate what was already known, but instead I wanted them to contribute to the body of knowledge that was already out there. This made it essential for them to learn what other researchers had already found out. Each group researched a question using print resources. I had originally intended for the students to use

the Internet for their background research. This became impossible if we were to to be ready to send out questionnaires early enough in the school year to give other schools time to complete them. I had to reevaluate the original plan of action given the fact that the Internet access was delayed and at that time no one could estimate the date that it would be in place. Fortunately, we did move ahead because we did not have access until December 3.

In keeping with the theme of technology in the classroom, we chose to use HyperStudio to develop the presentations to share the background research with the class. I showed the students samples of last years projects to illustrate the potential of the program. Unanimously, we agreed to do this year's project using the multimedia format because our ultimate goal was to educate others about the illness. We decided that a computer presentation would be far more interesting than the traditional reports and posters. This was true because the students were able to include digitized photos, art work, sound and text to create an interactive presentation. "It seems that education can be improved by engaging students in the development and use of multimedia as an aid to communication and learning" (Austin, 1993, p. 18). The students were generally motivated to work on their project because they enjoyed the variety of things which they could do and HyperStudio is a relatively easy program to learn the basics. Many of them were able to incorporate sound, digitized pictures, scanned images that they created, import graphics and word processing documents as well as create some animation. Site licenses for this program are very reasonably priced and modified home versions are available so that staff and students may use it for their

school work throughout the year. The final aspect of the presentation was to share the questions that they still had so that we could brainstorm a list of research topics. What made asthma an interesting topic to study is that there are so many unanswered questions that the students found it very easy to decide on an "original" topic.

2.4 Developing the Next Action Steps

Throughout the project I monitored the intended and unintended outcomes using the data collection techniques previously discussed. This told me how the project was going from the student's, Dr. Hessel's and my own perspective, and helped to determine the next step in the plan of action. I was looking for a growing independence in the students ability to do research, ask questions, develop hypotheses, evaluate and analyze their data as well as using the technology available to them. These changes will take some time to occur. As the students gain independence, I expected my role to change from teacher to facilitator. This was and is my desired outcome.

The next part of the project was slated to take the better part of the school year. For this reason I decided that it was important for the students to choose their own groups since they would be working together off and on for several months. This suggestion came across very strongly in the student journals. Each group chose their topic from the brainstormed list. Each group had to have their own topic within the class. I compiled a list of topics, group members and disc numbers that I posted in the room to overcome the problems of forgetting who is in the group and which disc belongs to them (see Appendix IV, Section 1, p. 188). Each group had their own large

envelope to keep their work in so that we would not run into the problem of the whole group being unable to work because the one student with the information is absent. I prepared a checklist/instruction sheet for the groups to keep them on task and aware of the next steps.

Many of the students had started to form their own questions about causes of asthma from their own experiences and from the gaps identified in the background research. For example, one asthmatic in the class has an asthma attack when she is experiencing increased altitude. She was curious to know if others experienced the same thing. Her group agreed to use this as their research question. This example meets the criteria I established that the question cannot be answered by looking in the current literature. The students had to be able to develop survey questions to distribute to other schools. The students needed to learn more about the regions of Canada so that they could attempt to determine what increases the risk of acquiring asthma in some areas. This aspect of the study ties in with the environmental and ecological units of study. Instead of gathering this information from the references in the library they can write to students and ask them what the general weather patterns are in there area. The students could collect weather information for a two week period for selected regions across Canada from the Internet and then ask students in each of these regions to monitor their asthma for the same time period. These two sources of information can be compared by the students so that they can look for patterns and correlations between the weather and number of attacks.

While the students prepared their surveys I contacted the

SchoolNet Support Group to ask them to post our project to the SchoolNet-Projects-Calls newsgroup for us on December 3, 1994 since we did not have e-mail. They posted a brief summary and asked other schools interested in collaboration to contact us by fax or through the newsgroup in the discussion area (see Appendix I, Section 3, p. 153). Messages posted to the discussion area are available for everyone to see. If it is a private message to one group in particular, posting it to a general newsgroup is not advised. There is usually too many messages being sent in newsgroups to clutter them with private messages. The Alberta Asthma Centre provided us with a general survey to mail to each participating school along with an information package I developed to clarify the purpose of the study and the expectation that at least 70% of the students must complete and return the survey so that the results will be significant (see Appendix III, p. 175). The completed surveys would be sent collect to the Alberta Asthma Centre via Greyhound. The Alberta Asthma Centre researchers were prepared to compile the data and return the results to us in tables that would indicate the number of asthmatics broken down by school, grade, age and sex.

Now that each group had selected their research project they must decide on appropriate questions. To simplify the process, we developed a list of common questions that must be asked by all groups. For example, demographic questions regarding the location of the school, grades, population, and number of males and females as well as the number of asthmatics in the school were asked as part A of the survey so that we did not have to reask the same question. I asked for volunteers to compile the survey questions to make sure that

questions were not asked more than once and that they were asked in a reasonable order.

The asthma letters that I received from the groups did not have the necessary information. I assumed that grade 8 students would be able to compose a letter to ask other schools to participate in our project. As a class we had discussed the information it should contain as well as the format of the survey. This was not specific enough for all students and as a result the letters were very unclear or inaccurate. I then provided them with "Asthma Letter" guidelines (see Appendix IV, Section 2, p. 189).

I prepared a letter to accompany the student letter and surveys. Ideally I would have taught one group how to use our e-mail program to send the document. Each letter was composed off line in Claris Works, spell checked and proof read by myself before the group had permission to send it. The students were instructed to use their journals to record the addresses and contact person for each school that they were using as well as the date we sent the survey to the schools. This was important to document because previous experience has taught me that the students could not remember what they had sent and where they had sent it. This year they had the responsibility of keeping track of the e-mail addresses as well as the contact people. By mid-January we were ready to start sending out our surveys and letters and were waiting for word that e-mail was in place.

2.5 Implementing the Next Action Steps

Throughout the remainder of the project it was necessary to return to step two, reconnaissance, so that the progress could be

accessed and explained. This step is necessary because telecommunications projects are dynamic. As the technology develops and grows we must be able to adapt to the changes and modify our plans so that we can make the best use of what becomes available to us or to work around what is not available. This reflection process indicated that a drastic modification to the plan was necessary if it was to meet the needs of the students. Information presented in this section sets the stage for discussion of the overall results of the study.

It was impossible to involve the students very much while I was trying to find schools to collaborate with us. Due to the many barriers we encountered it became my responsibility to find a way to contact other schools on the Internet. I tried to get e-mail addresses through the online white pages only to find that this service was not working. I phoned the SchoolNet Support Group to ask if there was any way to get the addresses and they told me to do what I had just tried. I told them that that did not work and they advised me to send them a list of what I wanted and they would compile it for me. I printed out a list of all schools registered with SchoolNet and asked the class groups to identify the ones that they would like to correspond with. I took this list to Central Office and used a computer there with e-mail access. I wrote to the SchoolNet Support Group and asked them to provide me the e-mail addresses for the schools the students had selected. I never heard back from them. Using Central Office for our e-mail was not an ideal situation and I was not eager to do correspond with the other schools this way because I felt the responsibility and ownership was being removed from the students and placed on myself. I was willing to do send the students' letters myself in the interm until a another

solution was possible. After these attempts for attaining addresses met with no success, I decided to wait until we had our own e-mail access.

January 16, I phoned Alberta Education and was told that e-mail was once again delayed and that we were advised to change our projects since the earliest possible date that we would have e-mail access was not until February. I was not willing to do that at this point but instead chose to look for other avenues of accessing e-mail. By the end of February we had a commercial provider for e-mail. This was not local which meant we had to incur long distance charges. I was encouraged to mail things between midnight and eight a.m.

This was not a problem because students could compose their messages off line using the program and then I would send it for them in the morning. This seemed to be a solution until I realized if we had e-mail and others did not it was useless for the type of survey we were attempting to conduct. Also, by March it was very unlikely that teachers would have the time to take on a new project.

I posted a more complete version of our project to the SchoolNet project section on March 15, 1995 (see Appendix I, Section 4, p. 154). The SchoolNet support group wrote back to offer suggestions on how to post it to other areas of the SchoolNet so that more people would find it (see Appendix I, Section 5, p. 158). Marco Campana from the SchoolNet Support Group said that the project was very interesting and they would post our findings from the survey for us. This was very good news because this supports Waugh's (1994) belief that the most important step is closure and sharing the findings with everyone involved. Our project remained on SchoolNet in the current projects for the remainder of the year. Unfortunately, the deadlines we

outlined in our project posting on SchoolNet came without anyone responding (see Appendix, Section 4, p.154). I found in the previous year that the schools that participated were the ones we contacted directly. I was not surprised the project posting did not elicit any responses. I used e-mail addresses that I found in various locations on the Internet to ask schools if they would participate. I did get a response back form Brazil. This would have been excellent because the students were currently studying Brazil as part of their social studies program. I was not sure if the language barrier would have been a problem. I know that the man I was writing to spoke English as a second language. I wrote in the letter that we could have the survey translated and that we did not expect it all to be done if language was a problem. I never heard back so I am not sure what the problem was.

While we waited to get e-mail access I thought it was necessary to continue on with computer activities to develop the necessary skills and comfort level so that we would be able to proceed quickly if we did start to generate some results from the asthma study. The activities had to contribute to the curriculum and fit the computer mini-lab schedule. The four core teachers chose to do an integrated SimCity project. SimCity is a popular game designed to simulate the development of a city that the user plans. We all taught the same group of students so we were able to work together on a special assignment. When we set up the assignment we decided that I would teach the students how to use SimCity in science, social studies classes would examine the planning of a city and the roles of the people involved, math classes would look at budgeting, and language classes would make a newspaper. I unfortunately knew only the very basics of

making a city and was not able to make a sustainable city at all. I had to ask students in the class to prepare to present the program to the class. This was another opportunity for the students and I to learn together and for the students to take on a leadership role. This situation emphasizes the fact that the teacher's role must change if we are going to use these activities in our classroom. There is no need for us to spend many hours of time we do not have when we already have excellent resource people in our room. For the student demonstration we hooked the computer up to the VCR for two to three students per class to show others how to build. They gave them practical tips and advice. The students asked questions of the "instructors" knowing that I was not the resource person for this activity. I could provide them with the criteria and some basic help but beyond that they had to rely on one another.

We developed the groups for this activity making sure that each group which wanted someone who knew how to use the program, had an "expert." Some students decided that they would be willing to come in at lunch to learn. We met most lunch hours over the two weeks prior to the activity for students to learn the program. I used this opportunity to learn more about the program from these students. A core group of approximately ten students never missed. Once the activity was over and marked several groups asked if they could take theirs home to work on or would continue meeting with me at lunch to work on it.

The response to this four day unit was overwhelmingly favourable. Once again they wanted more time on the computer. Some groups felt that one or two people dominated the computer time

because it became very competitive and each group wanted to build the best city. Therefore, they did not want someone with less skill doing a poor job. The competitiveness worked against many of them because they embezzled money so that they could build faster. Ultimately, this ruined their city because a disaster was preprogrammed to occur if the builder was dishonest. This was a very interesting lesson for them when they realized that cheating in this game would ruin them. Also, many of them took out bonds thinking that it was free money. They would brag about how much they had and then when the payments came due they would be bankrupt. The number one lesson from this activity was not to borrow money because it is almost impossible to get out of debt. If they remember that lesson and apply it in their lives, this grade 8 integrated unit was valuable. They also learned the value of sitting down and planning instead of going straight to the computer and "playing."

The grade eight class also used computers in an integrated science/math project. In science class they had to conduct six consumer product tests on four brands of any product. In groups of four they collected numerical data for at least four of the tests. In math class they learned to use spreadsheets to make graphs of the data. This was a skill I had planned to teach for interpreting and presenting the data from the surveys. This also presented another opportunity to use these skills. They discussed the different types of graphs and how they are used to present information. Each group of four was divided into two groups of two. Each of the small groups took on the role of an advertising agency that had to promote one brand of the product which they had tested. They had to analyze the data to determine which tests

were the most favourable for their brand and then present the findings in a graph. In some cases there was definitely one brand that was superior. This meant that the other group had to produce misleading graphs. They learned that by using a computer they could adjust the axes very quickly and distort the meaning of the data completely. They then presented these graphs to the class and the class had to vote on which brand they would buy. This was a fun activity because the students had to be creative in designing their ad campaign and they had to carefully choose what they would highlight and what they would omit. When they presented, their opposition found it very difficult to sit quietly because they wanted to say what was being overlooked. The students are now very aware that statistics can be used to mislead the audience and that the reader must be able to examine the contents to look for discrepancies. Most agreed that they must listen carefully to what the media is trying to convey and they must not take it at face value. This activity was greatly enhanced using the computer because the graphics programs make it very easy to manipulate the data until the desired message has been produced. If students had to do this using paper and pencil, few would have taken the time to produce many graphs from which they could choose the one that best suits their purpose. As part of this unit we used the *Streetcents* site, a popular Canadian television show for young adults similar to *Marketplace,* to download examples of product tests. We also looked at how companies are using the Internet to advertise their products.

There are many other excellent sources of information for other units in the science curriculum. Having only one line of access to the

Internet makes it important for students to be encouraged to share with others what they have found. Many students visited the *Virtual Museum in Hawaii* to see examples of dinosaur bones and fossils. Mostly the Internet was used for a motivational tool for some students. The merit of this resource is that students will attempt to examine a more current topic knowing that the Internet has more up to date information than the library. For example, one group of students wanted to study asthma and sports. They were aware that many hockey players have asthma and wanted to see if they could find out about them online. We looked and found many NHL hockey sites that were still under development. The information about each player was not there. Given the dynamic nature of the Internet, within the year the player information will probably be available. Some students would choose to explore the Internet during class time, especially the *Virtual Frog Dissection* hosted by the University of Virginia and then do their homework assignments from class at home.

To keep enthusiasm going for having Internet access I would encourage students to make use of the connection when they were finished assignments early to look around for interesting science sites. During a debate on drugs and alcohol one group asked if the Internet would have the Charter of Rights printed out somewhere. We found the Charter of Rights quite quickly and they used quotes to strengthen their debate. They were impressed by how easy we were able to find what they wanted. Once we did the search to find the document we searched the document for the key words. If this function was not available, they would have had a very long task of reading through the document looking for the clause they wanted. If the Charter of Rights

was in a textbook, I doubt they would have taken the time because their first comment when we were scrolling through was how long the document was.

One of the features of the Internet we should be capitalizing on is the large audience it provides our students. An activity we could do without e-mail that we shared with others was a virtual tour we created of the Red Deer and District Museum. I chose to do this with the grade sevens because it was a class of sixteen in a gifted science program. This provided me with a perfect opportunity because the activity was not directly linked to curriculum but because it was a gifted program I had the flexibility to build in extras. We chose to do the Museum because it was very close so we could make repeated trips if necessary. We used HTML to create a multimedia tour using scanned images, digitized camera images, sound, and text. Once we were finished we had two parent nights so that all students would be able to choose a night that their families could attend. Most students and many parents attended both nights. The students each presented their own display to the group and shared the demonstration of the equipment and programs we used. We had one student do his project on the Estonia display because it was about his great-grandparents settling in the area. During the time we were working on the tour I found an Estonian Homepage on the Internet. The student linked this to his display. During the presentation to the parents he logged on to Internet and showed us what was available at the Estonian site. The parents were very positive about the activity and the open house because they had heard so much about the project, they wanted to see for themselves. This activity was the highlight of the year for them

(see Appendix V, p. 190).

This project was put on our homepage available on the Internet (see Appendix VI, p. 202). Our asthma project was also on this homepage and was linked to the main registry for schools, Web 66 (http://web66.coled.umn.edu/Cookbook/contents.html) so that people all over the world could access it. I decided to do a virtual tour with grade 8 students on the City of Red Deer as an extra curricular activity starting in May. Three teachers worked on it so that I could help convert the documents to HTML while one teacher worked on proof reading and editing, the other helped by driving students to take photos and answering computer questions. The first phase of the project was completed late in June and added to our Internet site.

Unfortunately, due to uncontrollable and unforeseeable circumstances we were not able to complete the life cycle of a telecommunications project. All was not dependent on the final stages of the project. The students were provided a wide variety of opportunities to use the computer and some students took advantage of this at every opportunity. Their findings enabled me to draw conclusions regarding the use of telecommunications in the classroom.

CHAPTER IV

RESULTS AND DISCUSSION

1. Analysis of Qualitative Data

1.1 Student's Journal Responses

My original intent was to have the students use the journal throughout the year for the asthma study, guest speaker notes, and to summarize their learnings from activities. For the minority of students this was the case. The vast majority did not make an effort to buy the separate booklet as they were instructed. They preferred to keep a separate section at the back of their binder. I strongly discouraged this but some still did it this way. This was a new idea for the students to keep a science journal and many times they would forget it and then make the notes on separate paper that would be lost. As a grade eight pod we had a very strict homework policy with a homework room every night. Many of the students would complete their homework room time and still show up without their journal. I did collect them throughout the year but for some I could not look back at the running record of responses. I did have a record in my own journal of responses that seemed significant at the time. It would have been better if I could keep the record in my journal of the key responses as well as being able to look back at the total picture after the year was over. The journals were generally very positive. The students would comment negatively when discussing their group work and time limits. Any details of the project and computer work, however, were very positive.

The comments fell into five main categories: group work, HyperStudio, new learnings, comfort on the computer, and the value of the Internet. I found the journal to be a very effective way to check up on how the groups were functioning. These journals were a dialogue between the students and myself so they felt this was a safe way to report to me on who was taking over or not doing anything at all. I would let them know that the next class I would keep an eye on it and then deal with it as if it was something I had noticed myself. The students were very careful to make sure that it would not look as if they had complained. During the first phase the students overwhelmingly responded that they wanted to choose their own groups. Many said that they would be able to accomplish more if they were working with people they knew. I agreed that for the bulk of the project they would be in groups of their choice. Some found it helpful to be in groups and a few asked if they could work on their own. I could not allow students to work on their own because of the limited number of computers we had available at the time. One person responded, "I feel more comfortable working in a group now than I did at the beginning of the year." Another student said, "I enjoyed working with my group and working on the computer. I think HyperStudio is really a neat program."

HyperStudio received a very positive response in spite of the fact a few students "played" around with fonts, backgrounds and sounds so much that they did not get their assignment finished on time. Other group members were very frustrated because they would want to do their part but the others were monopolizing the computer by doing their special effects. When I would tell them to hurry they would show

me that they were not done and still had so much to do. This was largely due to poor class time management on their part. However, when adults first learn to use word processing many of us go overboard with fonts and manipulating the layout. This, then, must be expected of kids when they learn a new program. We must allow them time to explore and to get to know the program before we make them stay on task. In the end, the results will probably be better because they will have a better grasp of what is possible. It definitely motivated the students showing them what students had done in the previous year. One journal report said, "our Internet projects were very different from any other projects that I have ever done. That is a good thing. The computer had a lot of options to do. The information was very easy to put into a presentation." Another student felt,

> I have learned a lot on how to use the computer properly although I usually need assistance. What I enjoyed most about this project was actually working on HyperStudio on the computer with my partner because all the time I was learning and having fun. I think the project was great and we had a respectable amount of time to work on the project.

Often the classes complained about not having enough computer time. This student was not in agreement with those statements.

As mentioned we only had a mini- Mac computer lab for all students to work on. It was very difficult to block book it for a significant period of time. Instead, what I would do is book a couple of computers and then allow students to make the choice of working on their projects or doing their class assignments. I would have prepared a checklist of what had to be done and the due dates. This would keep the students accountable for their daily classroom assignments. Unless they did not complete their work we would keep this arrangement.

The option of using the computers during class time did motivate the students to get their work done so that they could continue to use the computer. Many students would also opt to come in before school, at lunch and after school to work on their projects. They did find using HyperStudio fun even though they were only allowed to use it for putting together their presentation. It seemed to them to be playing.

Many of the students I teach in science used the Internet for a French project in April as well. Their assignment was to find a French site on the Internet and then report to the class what they had found. Many of the comments in the journal reflected this experience. The common theme is that the Internet is frustrating. Later on in the year we had a lot of difficulty accessing the Internet because the phone number we shared with other local schools was always busy during school hours. During class time it was virtually impossible to log on in March, April and May. The students would be keen to find something and then find out the line was busy. We shared our phone lines with the other schools in the City, Separate and County Districts. We would leave it on redial and do something else in the meantime. Once we did get on it seemed that the line or System 7.1, the system software for Macintosh computers, was very unstable because the computer would crash. I do believe it was related to the SchoolNet site itself because most crashes occurred while we were visiting the sites at Carleton University, the host of SchoolNet. We would then have to log on again only to find the line was busy once again. When we did go to the *Louvre* or *cities in France* they were amazed at what we would find. One group presented the subway lines and how to plan a route through the city. Others presented the Catacombs, Impressionist artists, and the

Eiffel Tower to name a few. They were most interested in the graphics but were discouraged by how long they took to load. If the graphic did state the size, they became very good at judging if they wanted to take the time.

No one commented on the fact that we did not complete the survey or get to use e-mail. I kept them updated on our progress and I think they knew how frustrated I was already. As long as they got to use the computer for other things it seemed to be all right. Also, they had not used these functions before and did not know what to expect from being able to communicate directly with others across the country or around the world with the speed and efficiency of e-mail so I do not think they really knew what they were missing.

Many of the students became more comfortable on the computer. By the mid point in the year, I could allow the students to go to the library on their own because they knew how to get to the programs they needed and how to use them. Many of the students were very willing to share their expertise with their classmates. This was an extremely valuable resource because of the wide range of abilities in the classes. This statement by a student reflects this range. "I have always had a computer because my family has four of them. So how I felt in September to how I feel now really hasn't changed that much." Others did not know which way to put the computer disc in in September. The quoted student did monopolize the computer and took a lot of pride in showing others her skill. I did talk to her about showing and helping others so that they could do it on their own as well. This was very helpful for her and her relationship with her peers.

Others documented what they had learned about asthma. "I've learned that there are different types of asthma, different medications and times for taking your medications. More people than I thought have asthma." This increased insight was typical of many students. It was amazing to me to note how many asthmatics did not know what their own medication was for or how to use it correctly.

Student journals were very positive and for me this was reaffirming. Reading the journals was the inspiration I needed to keep plugging away because the students were very enthusiastic. I did not want them to feel that they had done all the introductory work for nothing. After reading the journals, I concluded that the students did not feel this was not a useful experience because many of them had already learned a lot about asthma, writing surveys, group work, word processing, HyperStudio, scanning, and the modem. As well, many students took photos using the digitizing camera which they incorporated into their presentations. They were learning a lot about technology and how it can be used to help them with their assignments. Unfortunately, from my viewpoint we were not getting the opportunity to use the telecommunications as I had intended.

1.2 Teacher/Researcher Journal

The recurring theme in my own journal is frustration. I was dedicating a lot of time to learn the programs and to get our system up and running with little support. If I ran into problems I could phone Alberta Education but it is difficult to trouble shoot over the phone. I was expecting e-mail to be in place at any time and I wanted to get started immediately because we were quickly falling behind and I did

not want to be rushed as we were the previous year. I kept reminding myself that we did the whole asthma study the first year, 1994, from from February to June. This year I had most of the groundwork in place by the first week of December. The work we did from September to December was done after February last year. As well, HyperStudio was new to the district and I had to learn that along with everything else. This was definitely the greatest point in our favour. The students and myself had a lot of time and energy invested in this project and I wanted to carry it through. However, at each turn we encountered more roadblocks. I was embarrassed after awhile to even bring up the topic to let the classes know that I was still trying. I felt it was necessary to keep them posted on what was happening since they too had developed their surveys and letters and I wanted them to be aware of the types of problems that are encountered when using technology. I felt that I had made promises to the students that I was unable to keep. It was very important to me that the students realized I was doing my best to keep the promises and that the situation was beyond my control. I felt that I jumped on the latest "bandwagon" before the technology was ready and while there are still many growing pains.

Our school was linked to Internet on December 3. We did not receive any information on how to operate the system. We were only provided with a fax that told us how to configure the programs so that we could log on to Internet. I was very fortunate to have found a very useful guide to Mosaic that taught me how to navigate. This guide also gave basic instructions on writing Hypertext Markup Language documents so that I was able to develop our own homepage and post it on the Internet.

The HyperStudio presentations were a high point in the process. The students made the presentation to their own class using the computer projection screen on the overhead. The presentations were very entertaining and in most cases the students could not decide who would present because they all wanted to show their work. I found that this method of presenting was far more interesting than the typical reading of a report. It was interactive and the students were very curious to see what other groups had done. HyperStudio leaves the doors wide open to be creative and unique.

Our school also received a fair amount of positive publicity as a result of the project. One class of students felt quite privileged to have been taped and interviewed for the local television news. Many of them taped the broadcast and then brought the tape in to class so that we could all see it again.

In spite of all the unexpected obstacles, I do strongly believe that the end result was worth it. I did observe many positive outcomes for the students and I have gained a lot from the experience. One of the observations I made was that being the first student to figure something out was a challenge and a motivating force for many. Often the students who have skill on the computer are not the most popular. Some students would come in with a group of friends to work but many would come in alone. I am sure this gave them some place to go where they could have fun and not worry about having a group of friends to be with. When one of these students figured something new out the others would want their help. This did give them the opportunity to "shine." I also found that this did carry over to science class because they would have experienced success and as a

result would feel better about themselves and try harder in other areas.

One of the grade eight students was repeating the grade. This was the third year in a row he had been in my science class. We did have a relationship that was improving over the years. He was involved in the asthma study during the 1994-1995 school year as well. I strongly believe that it is the time we spent on the computer that gave us a common ground. The previous year his family had bought a new computer, scanner and modem. He would come in to tell me what he had learned and would be my resource person for helping others on the scanner out of school hours. This year he had become involved with some local bulletin boards. I told him that I had the number for the AADAC bulletin board for teens, *E-Zoot*. He picked up the information from me and tried it that night with no luck. The next day he told me about his problem so I offered to help him that night after school. He came in and we logged on together and registered him. After that he had no problem.

A few weeks later he came to school very excited to tell me that he had written to Tragically Hip and received a reply via e-mail. We talked about this as a class at the beginning of the period. For the next few nights he would come in to my class after school to show others how to use bulletin boards and the type of games out there. A few weeks later he told me that he had logged on to a grade ten student's home computer. We had a discussion about computer ethics. This incident made me realize how fast people this age can learn and what they will do for "fun" without realizing the implications. We definitely need to address these issues before allowing our students access to technology that has that potential.

This student did not behave the same in my class as he did in others and I would like to believe that is related to the relationship that we established over the previous two years using the computers. It was definitely his strength and in my class he had the opportunity to share it.

One day after school a student came in to look around Internet. I was talking with him to keep an eye on the sites he visited. I asked how he found something that he was looking at. One student that was serving a homework room said, "I never thought I'd see the day Bobby was teaching Ms. Lewis something." This was a very positive thing for Bobby to hear because he was not a student who was passing science. He said, "at least when it comes to computers I know more than her." This to me pointed out a very drastic change in the teacher/student relationship. I was not afraid to admit that Bobby knew more and I would definitely let him think that if it would provide him an opportunity to feel good about himself and his accomplishments. From the comments made by the students present, I know that it was all right for a student to know more.

A very important part of the process was the shared learning between myself and the students. Several times throughout the year I would ask students to show me how they did something and then when I shared it with others I would always tell them that I had just learned this from whomever had taught me. I would also tell them who to ask if they were running into problems. When we were working on the computer we were definitely learning together. This was a very enjoyable experience for me because it did motivate them to learn. If someone were to ask if something was possible on

HyperStudio others would accept this as a challenge and attempt to solve the problem.

One of my most frustrating observations was made at the February Teachers Convention while I was providing a session on using SchoolNet. I had planned to show some of the services available as well as the projects that were currently underway. I was amazed at the number of questions regarding access. Many of the teachers attending the session had SchoolNet access but could not figure out how to use it. This experience has been extremely frustrating for many in attendance. We now had to address these problems to the frustration of those without access who were more interested in why they would want it. This was three months after the phone lines had been installed and the discs were in the hands of the pilot teachers. I found it unbelievable that they were not given any support. These people were extremely frustrated. This type of publicity could lead to the downfall of SchoolNet.

The teachers involved at the SchoolNet session I attended April 6, 1995 in Calgary stressed the point that they wished that they had chosen simpler projects for their first attempt. Diane Pon, from Alberta Distance Learning, agreed that it would be reasonable for a school to decide that for their first year on SchoolNet they would work towards teaching the staff how to access resources and be comfortable using it before involving students. This would also depend on the teacher's comfort level of not being the expert. I, personally, would rather get the students involved very early on because I have had very positive experiences with learning alongside the students. I was not afraid to admit to the students when I did not know how to do something they

wanted to do. Sometimes they would attempt to figure it out for us or I would. I think that it was valuable for them to work with me while I was problem solving so that they could see the process I used. Once the solution is arrived at they can take ownership in it as well and then share it with others.

As part of our agreement with Alberta Distance Learning in becoming a pilot school we had to evaluate the project in June, 1995. I have summarized our objectives for the project and the reasons we were unable to attain all of them. I have also made recommendations for the following year (see Appendix I, p. 148).

1.3 Focus Group

When I started this project I did not have a teacher based collaborative group in place to share ideas and experiences. I soon found that this was a necessary component of an action research study. Unfortunately, there were very few people around experiencing the problems I was. This was largely due to the fact that many schools in our area were having difficulties getting started. They had yet to embark on a collaborative project. Fortunately, I found a focus group that was starting up in May to provide teachers using the Internet an opportunity to share their experiences.

The group was moderated by Linda Stilborne, a member of the SchoolNet Support Group in Ottawa. The first week we were asked to introduce ourselves and share thoughts about what we would like discussed in the focus group. Ms. Stilborne used these introductions as well as her own thoughts to prepare a list of questions for us to answer within approximately four days to a week. There were six sets of

questions between May 12 and June 30. The introductions received responses from at least forty people from Hawaii to London, England. The greatest number were from the United States. Quebec had the most participation of the Canadian provinces. Throughout the process the number of replies dwindled. This was very unfortunate because one no longer knew if the replies were representative of the entire group. It is unfortunate that the last few sets of questions came at a time when everyone was busy with year end details.

My main interest for the focus group was discussing collaborative projects and other's experiences. I wanted to know what would encourage someone to participate in a project, what format they would prefer and what time of year they would rather become involved. Unfortunately, the issue of collaboration was not a focus in the group. We discussed project ideas and sites but mostly the conversation focussed on cost, teacher inservice, what having access to the Internet means to us, ethics of using the Internet, and the primary value of using the Internet as a resource as well as the downside.

A common question that participants expressed in the introductions was, how do we integrate the Internet into our curriculum? This is a very difficult question that must be addressed. Many of us reported our favourite projects and hopefully these were linked to our own curriculums. From my own experience, I know that it is very difficult to use the Internet effectively in the classroom, mostly because of the limited access. I always had to have a back up plan in place in case we could not get on line. As technology develops we may have some solutions emerge that will reduce the number of barriers we encountered. Many times I would find what we needed

and then download it and print it out for the students. This did provide me with a wide variety of resources and current information but it was done by myself instead of the students.

One of my aims in this project was to identify the computer ability of the students so that I could make sure that each group had an "expert." I was not sure if this was the best idea because some students did monopolize the computer and got very frustrated when their group members did not do something the way they thought it should be done. This same concern was also addressed by H. Thompson from rural Kansas. She stated that she matches ability levels together so that the stronger student did not inadvertently take over. I think this is a valid strategy because the others working on the computer generally do not mind stopping to help others working near by. I also had the students in pairs on the computer so the one that is not in control of the keyboard could easily slip away for a few minutes to help out.

Overall the focus group was a very positive experience. One drawback however, was that it took place during a very busy time of year. There was a strict timeline that we had to adhere to so that we could discuss many issues before year end and as a result there was not much time to think about and compose your responses. I did not have time to reflect on what others had said and respond to that. I was contacted by a teacher in California for information on our Virtual Tour and specific details about how I worked on it with the students. I did respond to this message but was disappointed that I did not have the time to take advantage of the opportunities being presented to me. This type of interaction is invaluable. If one does something valuable with students, the success must be shared with others. In return, one

can receive a wealth of information from others.

One issue that many members of the focus group were concerned about was developing an acceptable user policy for students and staff. This document needs to be comprehensive. Never having needed one before, it is difficult to know what must be included. One person asked and she was given addresses to find examples already on the net. We each now have many to choose from or to edit to meet our unique individual needs. We no longer need to feel like we are reinventing the wheel.

I was amazed at the generosity of the participants. To be successful we each need to share what we have found. That is the only way that the Internet is going to be useful for educators. The more people involved sharing ideas and providing information the more we will all gain. This sentiment was definitely shared among the group members.

1.4 External Partners

The original intent of this project was for the students to collect data and then share it with researchers in the field. I realized from the outset that we would each have our own agendas but I was confident that we would be able to be reach a compromise. I was not willing to remove the students' decision-making powers to succumb to the wishes of Alberta Asthma Centre and Glaxo Incorporated. It is my understanding that this partnership did not materialize for two main reasons: first that the partnership between Alberta Asthma Centre and Glaxo Canada Incorporated was not workable and second that we had such a late start up date. The Alberta Asthma Centre had the initial

contact with Glaxo in that they asked them for sponsorship for completing this project. The Alberta Asthma Centre is a non-profit organization with a limited amount of funding. They anticipated that we would be collecting a large amount of data that would be useful to Glaxo as well and in return Glaxo could provide the funding for the data analysis. Glaxo would benefit from receiving the data as well as public recognition for sponsoring this endeavour. Glaxo Inc. was more interested in collecting data from adults in five predetermined Canadian cities. We could have added a section to our survey that would be answered by parents so we could have worked around that if we could get schools to participate in the cities they had selected. However, I wanted our students to have more input in the locations being studied. We could have ensured that the five cities were among the list if the professional researchers did not mind surveying more as well. I was not consulted on the arrangements. October 12, 1995, I met with Dr. Hessel to plan our strategy for this year and at that time he was confident that we were moving ahead with their support and spoke of travelling to different school districts across Canada to present the project so that we would gain their support. We remained in contact over the next few months while students did their background research and we waited for e-mail. On December 7, when I contacted Dr. Hessel to tell him about our progress he told me that he had met with Glaxo and they were no longer interested in the project. I was not made aware of what had transpired. Dr. Hessel and I decided to move ahead as planned, but we decided we must limit the number of schools surveyed because we no longer had the necessary funding to enter a lot of data and interpret it.

The Asthma Centre wanted to survey elementary students but were amenable to the fact that middle school students would far rather interact with middle school students. They had prepared an initial survey for us to administer but did not mind if we followed this up with the students' survey questions. This was valuable because each of the students completed the prepared survey. Hopefully, this gave them a better understanding of how to construct a survey. They would also know the questions that had already been asked. Dr. Hessel was very concerned with validity and the way we selected the schools. I wanted the students to have the opportunity to choose the schools they wanted to work with instead of me dictating that to them. The researchers at the Alberta Asthma Centre preferred that the schools were chosen more randomly than that by drawing from a hat. I did agree to do this as well as allowing each group to choose a school. It was the Alberta Asthma Centre's intent to survey three regions of Alberta: Edmonton, Calgary and Fort McMurray. They wanted to survey ten schools in each city. There were not ten schools in each of these locations registered with SchoolNet at that time and this would really limit the number of other schools that we could contact since this would already match up each group with at least one and in some cases two schools. He also wanted to be sure we surveyed some communities which were primarily French communities as well. He asked me if we could have one class do strictly French schools. This did pose a problem for us in that grade eight French skills are not at a level that they are fluent enough to communicate for a survey on a specific topic. I had agreed to work around this with the help of our French teacher but, with the other problems we encountered I did not have to. I was concerned

about targeting specific schools because I felt it needed to be an open invitation to be sure that we did have some respondents. I thought a lot of valuable time would be wasted if we opened it up to select schools and then did not hear back. We would then have to resort to our back up list and repeat the process. When time is at a premium I do not think that this plan was advisable.

The Asthma Centre was very frustrated with the delay in the start date. I spoke with Dr. Hessel December 15 to tell him that we now had a list of Canadian Schools on SchoolNet and that we still did not have e-mail. He was going to attempt to come to Red Deer early in January to help decide which schools should be approached. This plan did not materialize because it was very evident that we were not going to be able to continue the project as planned.

This "relationship" was very frustrating for me because I was an outsider. Our two external partners were negotiating around our project. We were their way of collecting a vast amount of information and we were willing to accommodate their needs as long as we could also do what interested the students. Businesses have a very difficult time getting their surveys into schools. I found this out in the first year of the study when some schools responded with the fact that they were interested and believed that the survey was valuable but it was written in their school board policy that any outside agency conducting a survey in the school must receive written permission from the school board. They also recommended that this be done very early in the school year. In other schools we were able to conduct the survey because the primary focus was school kids surveying their peers for a school project. The surveys had to be signed by the parents and it was

made very clear how the results were to be used so the schools left the responsibility with the parents to decide if their child was to participate (see Appendix III, p. 175). The means we had to communicate was far cheaper and quicker than what the Asthma Centre had available. Since funding was a key issue it was to their advantage to go through us and save the mail, courier and long distance costs.

I wish I had had the opportunity to speak directly with Glaxo's representative so that I could have tried to reach a compromise. I am not sure that we were accurately represented since there was an intermediary. In light of what happened with the lack of e-mail, we would not have been able to keep our end of the bargain. However, I do plan to try this project again next year. Our original proposal stated that we would do it for five years, and I would have liked to keep this avenue open. I still feel that the strength of this project lies within the fact that the students are contributing to the knowledge in the field. This is an avenue that businesses and educators should pursue. The possibilities for pooling resources with this type of partnerships are definitely a prospect that needs to be explored.

2. Analysis of Quantitative Data

The students were given four pre-surveys over a two day period the first week of September. Three of these surveys were five point Likert scales used to assess student attitudes towards computers, learning science and science in society. The fourth survey was used to determine the amount of experience the students had previously had on computers, their confidence level and what they hoped to learn. All students received the same set of

instructions for each survey. If they had questions, I would define words for them but I would tell them they must do their best because I did not want to influence their answer. Very few questions did arise. I told the students that they had the choice of putting their name on the survey because I did not want them to be leery of answering honestly when many of the questions were about me specifically and the way I taught the class. I was interested in overall class comparisons on the pre and post test as opposed to individual comparisons.

The survey results may be inconclusive based on a number of circumstances. In an attempt to provide the students with privacy and anonymity I did not closely monitor the completion of the surveys. I did not want to influence their answers in any way. In May I told the students that the three surveys were the same as the ones completed in September. I stayed in the room and answered the few questions they asked.

Another aspect of concern is the timing of the survey. The focus of the survey was the science class. I also teach these students theme four and five of the health curriculum. We had recently completed three weeks of health and Easter vacation and were just starting our last unit in science when I administered the survey. This may have influenced their results if the students were reflecting back on recent weeks instead of the past year. Along with this is my observation that many students at this age tend to work to get things done instead of applying their best effort. This was evident in the fact that 9% of the students handed the survey in without realizing there was a second side on the Computer Attitudes and Science Learning Inventory surveys.

Middle school students are at a very social stage in their development and as a result many external variables are present when doing a study. For

instance, the week I gave the survey one of their peers had attempted suicide on Wednesday. Friday was her first day back to school and many students were very distracted. The week I gave the survey was also band festival week. Sixty five percent of the grade eight students I teach are involved in band. They had missed two half days of school that week to perform as well as putting in extra hours for practice. The last month of school is a very busy time with culminating activities which makes it difficult to choose a day with out distractions.

Another important variable, that was beyond the scope of this study is the fact that there is a wide range of reading abilities among students of this age group. For this study, the respondents range in reading ability was from grade two to university level. This may have made it difficult for some students to read, comprehend, and then answer the questions truthfully.

New students to the class did not participate in the post survey and I removed all surveys completed by students that moved during the year. In this case I was fortunate that those students had put their names on the pre-surveys. I provided the students enough time to complete the surveys so that they did not feel rushed.

For this study, I was interested in determining the overall changes in the pre and post tests for the complete group of students. This made it possible to allow the students the option of omitting their names. The students were no doubt aware of my bias and I believe that this would have played a role in the way they answered the questions. If the students thought I could look at what they had chosen for responses, I think they would have been less honest.

All three of the five point Likert scale surveys were analyzed using Statview Descriptive Statistics and/or the Statview ANOVA programs. In

this analysis (ANOVA) provides not only the comparisons of the mean, standard deviation, and standard error of the mean but also provides comparisons between the pre and post surveys for the three classes. This is done using Fisher's PLSD test, Scheffe F-test and Dunnett T-test. In all comparisons I looked for a 95% significance level for the Fisher's PLSD test and Scheffe F-test. Using a competence level that high allowed me to make definitive statements about the impact of the use of telecommunications and the related technology in the science class.

2.1 Computer Attitude Survey

This survey was adapted from the survey used by R. S. Erickson (1993) for his thesis which studied the "Effects of simulation in SCUBA instruction." The survey was used to measure the differences in attitudes towards computers of a high school group of students taught SCUBA using computer simulations compared to those that received SCUBA instruction in the traditional lecture style. This study tested the validity of the survey instrument.

On all surveys it was very apparent that there was a ceiling effect. Many of the pre test scores already showed that the students had a positive attitude towards working with computers. Without completing the asthma study I would not expect the students attitudes and opinions to reflect much more growth.

The most surprising result from the survey was three of the responses that showed significant changes dealt with computers taking away jobs from people. This surprised me because I was hoping to teach the students how to use the computer as a tool in their work. The message may have been that the computer makes work so much

easier it does not require as many people. In keeping with the importance computers will have in the future workforce the other significant questions supported the idea that everyone must be computer literate to be able to succeed in the workplace.

The question with the most significant change on the survey was "computers will make it harder for people to find jobs." The students did disagree (2.38) for the pre survey and were neutral (3.03) for the post survey.

I was surprised that question 29, "computers help us to be more creative" did not receive a stronger response on the post test. The students had very creative and unique presentations when they used HyperStudio. They may have felt that the computer itself did not allow them to be more creative just that now they could use their creativity. The other possibility is that there was a ceiling effect. The pre-survey mean was 3.94 and the post-survey was 4.00. The students already agreed with the statement.

The following table indicates the questions on the survey for which the pre- and post- responses showed a significant difference of 95% or more.

Table 1

Questions with Significance on the Computer Attitude Survey

Question Number	Computer Attitude Survey
1	I would feel comfortable working with a computer.
2	Computers will improve our society.
11	Computers are extremely frustrating machines.
13	Computers will make it harder for people to find jobs.
14	The ability to use a computer is as basic and necessary to a person's education as reading, writing and arithmetic.
16	Computers are not very important to most people.
17	Material which is otherwise boring would be interesting when presented using a computer.
18	Everyone should know how to use a computer.
23	Computers will be important for Canadians in their future work and jobs.
28	If technology continues to develop at its present pace, soon we will be out of work and computers will have taken our place.

Fortunately, the number of students who feel comfortable with the computer has increased by 10% to 80%. This is also reflected in the response to question 2, when 74%, 17% more students agreed with the statement, "computers will improve society" on the post test.
The students' increased comfort level is also reflected in their stronger disagreement with question 11, "computers are extremely frustrating machines." Thirty percent more students strongly disagreed with this statement on the post test.

The students' response to question 14, "the ability to use a computer is as basic and necessary to a person's education as reading, writing and arithmetic," is in strong support of my original belief that we need to be providing the students with experiences that will be useful in their futures. Eighty percent of the students agreed with this statement on the

pre and post test. I would agree that it should be an integral part of their education but the use of the computer should be used as a tool to help them with their school work. The results to question 17, "material which is otherwise boring would be interesting when presented using a computer," supports the hypothesis that computers are a motivator. Twenty two percent more students strongly agreed with this statement on the post test. The journal data confirmed that students enjoyed working on HyperStudio and presenting their findings.

2.2 Science Learning Inventory

This survey was adapted from the Science Learning Situation Inventory (SLSI) which was designed to assess a teacher's performance and quality of teaching. It can be used as a self-assessment or done by external observers. In this study, the survey was done by the students. The intent of this survey was to use the results to compare any perceived changes in how they were learning science this year compared with other years. The computer projects that we did were a significant part of the year not so much in the time spent but in terms of what will be memorable for the students. Having not completed the Asthma Study, I would not expect for there to be a great significant changes. The students did not really experience how science and technology could be used to collect information about the issue. Instead we had to concentrate more on other uses of technology. In much of our work it was used as a presentation tool.

Table 2 indicates only those questions with a significance pre- and post- survey differences of 95% or more.

Table 2

Questions with Significance on the Science Learning Inventory

Question Number	Science Learning Inventory
1	I am able to make my decisions on my own and decide how I will carry them out.
2	I choose and conduct my own experiments occasionally.
4	The science class spends time organizing, analyzing, and interpreting data collected in a given experiment.
6	I learn science in a manner similar to the way in which scientists do their work in science.
7	I am able to use the laboratory, classroom, library, the environment outside the school and other people as possible sources of information for my science studies.
10	The class takes part in discussion of myths, superstitions, misconceptions, prejudices, advertising claims, etc.
11	I am allowed to pursue questions that may arise in the science activities.
12	The teacher shows concern for the development of positive feelings and attitudes in students towards science and learning science.
13*	The students are expected to work towards their own answer to a scientific problem rather than have to get the "correct" answer which the teacher expects.
15	The teacher encourages students to come up with answers or views which they can support but which may be different from that of the teacher or classmates.
20	A wide variety of activities is used in lessons to solve scientific problems and to learn about science (examples:listen to the teacher, discussions, laboratory work, watch movies, work in the library, use the computers, field trips)

Of the three surveys using the Likert scale, this is the only one that had a standard positive response to all questions. The positive response to each question was 5, this very frequently describes my science class. This is the way the scale had been validated so I chose to leave it. I believe that this did not influence the results because the one question that I know should have received a low response was number

eighteen. I definitely did not make this a focus as the results indicate. The response was already between "seldom" and "sort of describes my class" which would indicate that in the past years this had not been a focus either. Two out of the three classes had significant changes in their response to this question indicating that we used these resources less than they had in the past.

Question number seventeen, "the students perform studies or parts of studies on their own with little or no help from the science teacher," may be misleading depending on interpretation. I was surprised that this did not have significance because in my opinion the students had many opportunities to plan their own experimental procedure. However, I am always available to help. Generally, I will not tell them how to do it but I will attempt to ask questions to focus their thinking. Therefore, they do not perform the study with little or no help from me. The post score was higher than the pre score, but not significantly.

In my opinion, the results of this survey were already favourable which helps explain why there was not greater significance in the results. Overall, all questions had a higher post survey score than pre survey score except number eighteen as previously discussed. The question with the greatest change was number ten referring to the class discussing superstitions, myths and advertising claims. Twenty one percent more students agreed with this statement on the post test. This survey was done during our consumer product testing unit in which students conducted their own tests and then developed an advertising campaign. We did examine many advertisements from all types of print media as well as the Coke and Pepsi advertisements

available on the Internet.

Another significant question was "the students are expected to work towards their own answer to a scientific problem rather than have to get the "correct" answer which the teacher expects." In our study of asthma there was a strong emphasis on finding original information to answer their own research question. The students knew that I wanted them to answer their questions by doing research that had not previously been documented in any of the literature to which we had access. I wanted them to learn something new for themselves and for the researchers. There was no place we could look to get the answers.

As indicated in Table 3 the Inquiry Learning section had the most questions which showed significant increases. The focus of the study was to allow students the opportunity to conduct their own research. I believe then that the results indicate that the students did feel they had more control over their learning than they had in more traditional science classes.

Table 3

Domains tested by each question on the Science Learning Inventory

Domain	Question Number	Question Number
	Significance <95%	Significance >= 95%
Inquiry Learning	3*, 5*, 8, 9	1*, 2, 4, 6, 7*, 10, 11*
Affective Behaviours	14*, 16*	12*, 13*, 15*
Teaching Learning Process	17, 18, 19*	20*

* indicates questions with a pre-survey mean of 3.5 or greater

2.3 Science in Society Survey

Only two questions on the Science in Society Survey received pre and post survey response with a significance of equal to or greater than 95%. The two statements are direct opposites which would test if the students are in a response mode of all one extreme and are simply answering all questions in agreement or disagreement. Since these two questions had significant results it would indicate that the majority of students are answering the questions as intended. The response to this question would indicate that as a result of participating in the telecommunications project the students have more of an awareness that science is all around them and it is not something isolated in the science classroom. I am not surprised that there was not a greater significance in the results, as previously stated, because we were unable to complete the project.

Table 4

Questions with Significance on the Science in Society Survey

Question Number	Science in Society Survey
1	Science is important in our every day lives.
6	Science is not important in everyday life.

Question number eight is the only question of this survey that received an unexpected response. It stated that "science exists for the benefit of mankind." The pre test scores were 3.79 which is already in agreement with the statement. The post test score was the same. I had expected that they would feel more strongly about this statement after conducting the study. Given the fact we were unable to complete the project the students may not have realized the impact that a study of this nature and magnitude

could have. Also, the mean is already weighted towards the agree response, therefore something very significant would have had to happen to increase it.

For future studies of this type I would recommend coding each students response sheet so that individual responses can be examined. At the beginning of the study my interest was in general changes. Now, however, I know the students who I spent extra time with as well as those that seemed very apprehensive when using the computer and as a result I am very interested in how their attitudes changed if in fact they did. I would also suggest that the responses be changed to SD, D, N, A, SA instead of the numbers 1-5. This would help students to focus on the question not on which number goes with which response. At this level I think it is imperative to make the survey as user friendly as possible.

2.4 Responses to Computer Survey

The purpose of this survey was to assess the students' ability on the computer so that I could make sure that I could pair ability levels when the need arose. This was also useful for me to gain an understanding of the students' ability level so that I would know what to expect.

Eighty seven grade eight students responded to the survey the first week of September. This survey was only done at the beginning of the year; therefore there is no record of the number of students who purchased a computer throughout the school year.

I was very surprised that the majority of students owned computers. This was reflected in the fact that over 90% of the students were comfortable working with a computer as shown in the Computer Attitude Survey. The surveys did not indicate how many of the students actually used the

computer at home. I would recommend asking more specific questions to determine how the computers were used by the students.

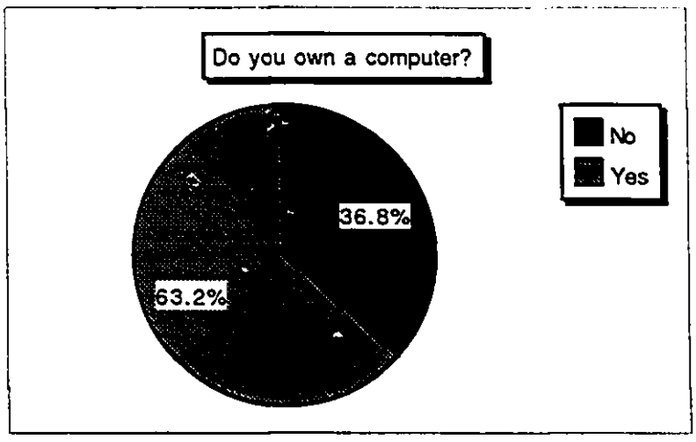

Figure 1: Do you own a computer?

As expected the majority of students owned IBM compatible computers. A large minority, 15%, owned Macintosh computers, and 31% owned other brands. This was unfortunate in that it is very difficult for students to work on their assignments at home and at school. Students are very quick to adapt their skills from one computer format to the other and with the windows environment there are many similarities to the computers at school. I found that even though students may not be used to using the Macintosh computers knowing how to use any computer was an asset in class.

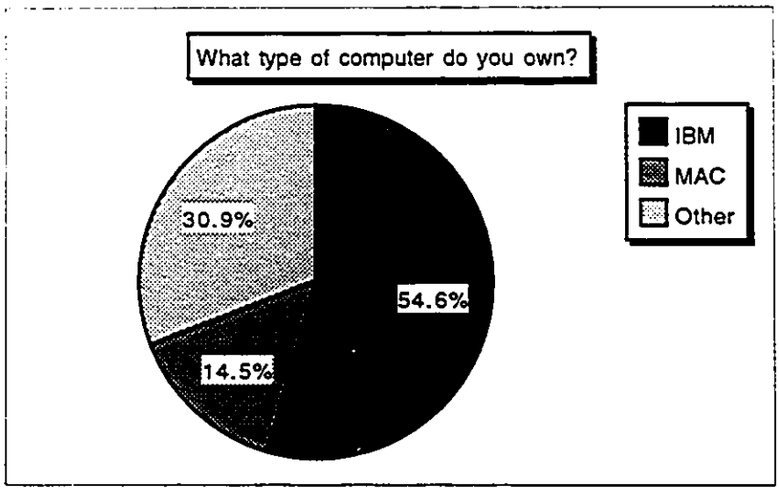

Figure 2: What type of computer do you own?

One quarter of the students indicated that they had used a modem. Most of these used it during grade 5 when they did a study that involved downloading data from a database at National Geographic. Only one quarter of the students owned a modem. Many told me that they knew they had one but no one in their family had ever used it. I did encourage some to join the local *Apple User Group* or *E-Zoot* , the AADAC bulletin board.

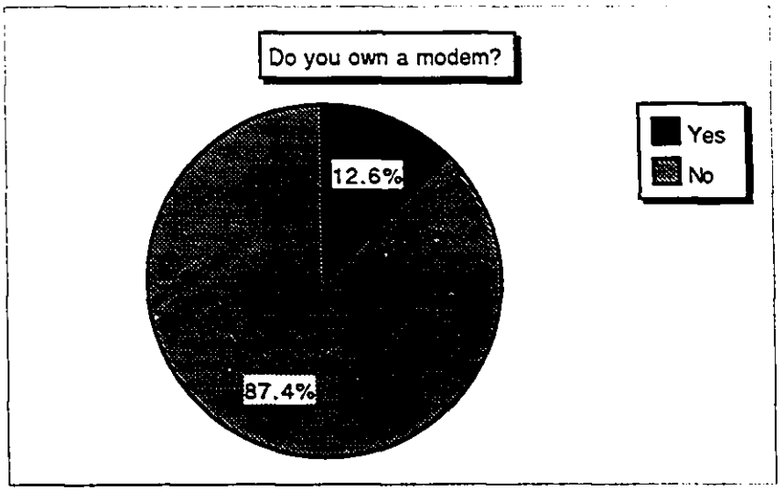

Figure 3: Do you own a modem?

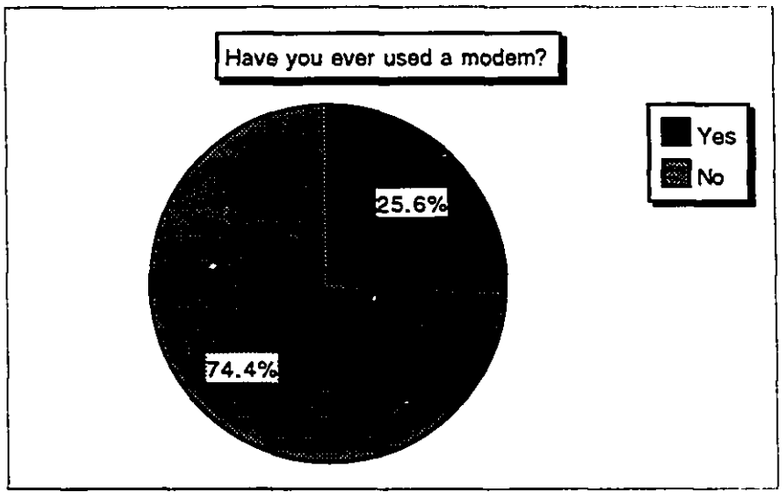

Figure 4: Have you ever used a modem?

I was very surprised that only 1.2% of the students rated themselves as experts. This did surprise me because many middle school students often over rate their abilities. Some that I felt were very competent responded that they were intermediate. In this case I would say that intermediate was

encompassing a broad range of abilities. For future surveys, I believe that there needs to be criteria established for students to determine their ability. Their own opinion is important in that if they feel accomplished they may be more apt to try more. It has been my experience, if the student feels like a beginner, in all probability he/she will hesitate to try something new.

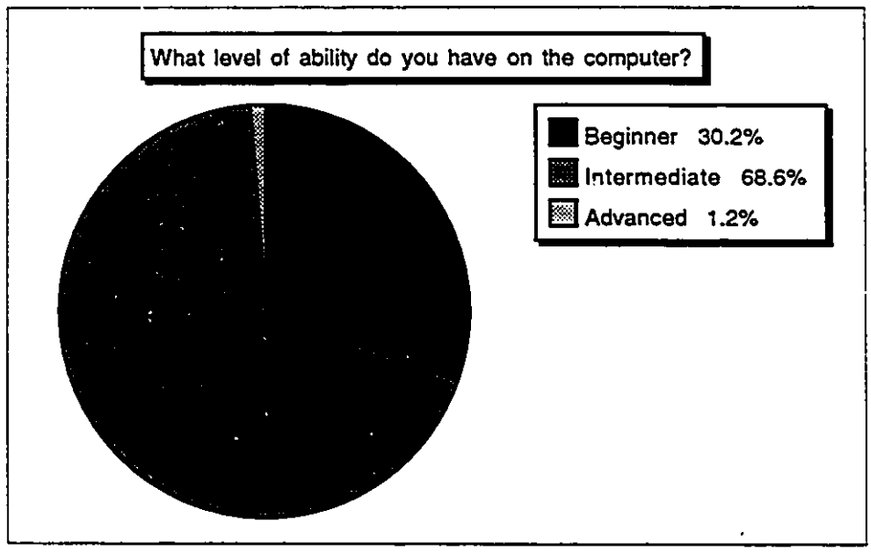

Figure 5: What level of ability do you have on the computer?

3. General Discussion

This project did encounter many problems and the original goals were not entirely accomplished. The problems we encountered are to be expected when becoming involved in a new project. It is very easy to become frustrated and give up. However, I found by sticking with it and trying new projects we were able to still experience success and learn the value of the Internet.

The problems we encountered can be summarized by these statements.

First, the late start up date for SchoolNet. Secondly, no e-mail access was provided with the SchoolNet account. Thirdly, the fact that we frequently encountered busy signals when logging on to SchoolNet from March-May, 1995. The lack of communication between Glaxo Inc. and ourselves and the loss of Alberta Asthma Centre as collaborators. Finally, the limited number of computers in the school until late April, 1995.

One of the first projects I undertook when we began to encounter problems was to develop our schools' homepage to put on the Net. I approached an Internet provider, CCINet in Edmonton, and asked them to post our homepage. Our homepage told others about our asthma project and invited inquiries as well it told about our school and other projects we were doing. I did hear from others about our homepage but no one offered to participate in the asthma survey. I also registered our school homepage with Web 66, which is linked to many schools world wide with a homepage on the Internet.

I found having our own homepage very useful in many ways. If we were to log on to Internet the way Netscape is set up, we would be automatically transferred to a computer in California. This often causes problems because it is used so often that we would receive a message that it was busy and to try again later. We would then be faced with a blank screen. This in the beginning was very frustrating because I had no idea where else to go. I also did not have anyone in the district that could help me at this point. Through trial and error I slowly developed a list of useful sites to put on our homepage (see Appendix VI, p. 202). This screen would be the first screen that one would see when the program starts. This would provide many choices of places to go. If one does not work, there are many others there to try.

Another advantage of having a personalized homepage is that it keeps track of addresses that one visits repeatedly and leaves them visible so that others using the same computer can use them as well. A description of the site can be programmed in so that the viewer may make a decision on the usefulness of the site to them before going there. When I found sites that I thought would be appealing to students, I would add it to our homepage. They knew to click on any of the blue or purple words and that would link them to another site. I did not have to teach them how to do searches at first and run the risk of them finding something that would be unacceptable. The sites I chose to add to the homepage were reputable. Once at a site one can leave it very easily. This did not present a problem because it was my experience that educational sites were linked to other educational sites and this made it "safe" for students.

This was a benefit because of the controversy over students accessing the Internet. I found that if they saw the resources I had put on the Homepage they would be interested in those and less likely to look around. If they were working on a project, I would compile a list of sites for the students on the homepage. As a result they would not be learning how to use the search engines. Students were permitted to do searches, however, only if there was direct supervision. Our Central Office mandated that students must be monitored while using Internet. If students were working after school, I would work at my desk or with other students while they explored. I did keep a dialogue going with them throughout their exploration to make sure they were staying within limits that I would find acceptable. This was very beneficial because they would tell me what they were finding and how they did it.

This precaution is extremely important so that parents feel comfortable

with their child using SchoolNet. If they are working in a particular area, NASA for instance, I will leave them on their own. If students are doing searches, I do sit with them to make sure that they do not come across inappropriate information. The risk of losing our Internet connection is too serious for me to allow students free access. However, this does present a logistical problem for me because I need to be present when students are accessing the Internet. Many school districts have implemented a stringent ethics guide. Educators would still need to oversee the student's use of the Internet; however, hopefully the ethics policy would reduce the number of students looking for undesirable resources if they know the consequence is that they will lose access privileges. Our district is currently in the process of examining this issue and the solutions which will hopefully assist teachers in the upcoming year. At this point I am unable to determine how much of a problem this would actually be since I have not had experience with allowing students unsupervised access. I firmly believe that if there is enough close at hand they will become involved in that and will not be as likely to look for other information. I also believe that if students have a specific purpose when they log on to the Internet they will not be considering sneaking in to things that we would not allow.

In the spring it became very difficult to complete any projects during school time. The phone line was busy for most of the day. Fortunately, for the virtual tours we did not have to be online except to gather ideas and to look for examples of how to do things. If we were depending on access for research we would not have been able to do it during the day. It would have involved doing it at night and saving the information to disc.

Again, I would have been learning a lot about the Internet but the students would have been excluded. It can be very time consuming to find

the latest information because "the Internet is a volatile and changing virtual environment." (Sellers, 1994) This is a very positive aspect of the Internet because the information that we access is being updated daily and new resources are continually coming online. However, the problem is that we do not have time to search daily. I did many searches early in the year to find sources of information on asthma. From January-April the information I found was not very useful. On May 12th the web search turned up an extremely useful list of resources. They were interactive tutorials written by The Children's Medical Center of the University of Virginia. This is a comprehensive network of health facilities dedicated to the care of children from birth through adolescence. It is a hospital without walls. We linked these to our homepage and the asthma study on the Internet. This interactive tutorial would have been far more interesting and useful to the students than the pamphlets we had.

Another difficulty we faced in implementing this project was the limited number of computers that were available in the school. I needed to train some students to be experts on navigating their way through the menus of Internet/SchoolNet as well as HyperStudio. There were already students who were competent on ClarisWorks, the word processing program we used. The reason I needed the experts was that I could not teach a class lesson on using any of these tools because I could only have six students at a time working on the computers. I could not teach six students while the other 26 worked on other assignments and then switch.

These factors together made it impossible to fulfil our end of the agreement with the Alberta Asthma Centre or Glaxo Incorporated. This was a very important part of the project in my opinion and I will pursue this again when I know that we are underway with the project next year. I will

not involve others until I know we can meet their expectations.

For many projects I believe it would be extremely valuable to have two teachers working together. One teacher can serve as the computer expert and help students access the Internet and work on the computer while the other teacher can concentrate on content and style. This way the teachers are introduced to the Internet and a wide variety of projects without having to spend an immense amount of time, which is more often not available, to learn how to do everything on their own. One such project I did was with seven of our grade seven students who have been identified as having learning disabilities. This project was a lot of fun because they were so keen and willing to show it. This also provided an opportunity to examine the process of doing research using Internet resources since I was unable to do this aspect of the telecommunications project with the asthma research. The grade seven students were in a small group of their peers who they knew very well and did not have to care about what they said or did. They did a research project on endangered animals, which ended up being whatever animal interested them. We found a lot of their information at *Sea World* and *Busch Gardens* on the world wide web. There was an incredible amount of information organized by topics such as food, habitat, reproduction, and conservation. They would select what they wanted. I would work with one student on the computer and then they would help the next one. They did have to use other sources of information as well. At the end of the project they completed a short evaluation of the project. A sample of their responses are:

> "Computers help me to find info more easily."
>
> "This project was very fun. We should do something like it again sometime."

"This project was the funnest project I ever done in my life."

"I learned how fun working with computers is. It is easy once you know how."

For this project it was very important that the students had a prepared outline indicating the types of information they were looking for. This allowed us to quickly filter the vast amount of information and retain only that which was relevant to their projects. They were amazed at how much information could be found at one place. For myself, it was most interesting to watch how their confidence was built over the two week period. Many were very reluctant to use the computer and would not try anything on their own. They wanted me to do it for them. I would show them once and then watch them until they got it right and then left them on their own. I would check back and over time they would be very excited to share what they had done. They also were sure that they would not be able to help someone else. By the end of the project they were showing each other everything and competing to be the one to tell how to do something. The transformation was amazing to witness.

One of my observations was that students that are not involved in computer projects but hear about them are often very eager to find out when they can do one. My grade seven science class was very disappointed that I would not do the SimCity unit with them. I told them I had to save it for grade 8. Every chance they got they were trying to figure out a way to use it. In the unit Changes to the Earth Surface they had to design a piece of land that would show the unit vocabulary. A few groups did this on the computer. They designed the landscapes and then put street signs to label it. They presented to the class using the computer. Two other groups found that very interesting so they asked to do their glacier presentation using the same

program. They created a landscape that showed an area that a glacier had passed through. I think that the students using the computer took more time to create their projects than those making posters because it was unfamiliar to them and they had to try many things before it would look the way they wanted. I was also very leery that it would work and tried to pose every possible problem before they started. Ultimately, I left the choice up to them. This just served as an incentive for them to prove me wrong and they did.

CHAPTER V

CONCLUSIONS

I am an advocate of using Internet/SchoolNet as a resource in the classroom and more specifically capitalizing on the opportunities it provides for students to be involved in current, relevant and collaborative research. I do believe that this is not another "fad" that will be replaced in the near future. After having done this project for the past two years, I know that educators must evaluate how we can use this resource as a tool in our classroom to enhance our curriculums. There is a resulting paradigm shift when we consider how the role of the teacher and student must change to accommodate this technology. This will not happen over night. Slowly teachers will see the benefits and as this resource becomes more accessible and user friendly others will become involved. We must remember that we cannot jump in without careful planning because we run the risk of technology becoming the focus not the means of reaching an end. This planning must take into consideration that using technology is not an add on to our current programs but instead replaces something we are currently doing by doing it better. We must provide our students the opportunity to gain the knowledge, skills and attitudes which will enable them to be productive and successful in their future endeavours. Technology is changing at a phenomenal speed. We can never expect to keep up with the technology that is being used in the workplace. However, we can provide the students with opportunities in the classroom which will help them to be more comfortable learning. When we learn along side our students we are modelling the skills necessary to become a life long learner. The hidden

curriculum is that to keep up with the changes that are inevitable in a career one must be willing to make the time and effort to learn.

As is evident in the SchoolNet evaluations for 1994 and 1995, there were marked improvements in many areas of SchoolNet (see Appendix I, Section 2, p. 148 and Section 6, p. 160). It was more accessible and user friendly. In comparing the original objectives as submitted in the application we were much closer to achieving them in year 1. Without e-mail, the most used feature of the Internet, collaboration is nearly impossible.

For teachers embarking on this type of project I would encourage them to start after systems are in place, to be realistic, and flexible, to ask when help is needed, and to establish contacts early and ensure that there is constant clear communication between all participants,

The one regret I have after working on the Asthma Study during the 1994-95 school year is that I had the students start something we could not complete. I truly believe it was a worthwhile project and one that I will attempt again next year with a smaller group of students taking a science option. This way I will have the flexibility in the curriculum to switch modes to another project if the need be. We can simultaneously be working on other Internet projects as well. That way the students can see more than one aspect especially if once again we face insurmountable road blocks. I was comfortable learning with the students and in my opinion this was very valuable for myself and them. However, starting while things were still in transition and tentative did create unforeseeable problems that I would have rather avoided.

This project was very comprehensive in its intent and as a result of the frustrations we experienced I would not recommend to others starting with a collaborative project. New Internet users should start out small and

realistically with a research project so that students can learn more about the Internet and information available. I would also find select newsgroups with discussions pertaining to a topic we are studying which the students can monitor and then participate in so that they can learn to use the mail system. I would also filter through the many calls for collaboration for on line projects and select one or two for the students to participate in because I firmly believe that it is essential that we support one another's projects. I know how frustrated we were when others did not offer to participate. We will do our part in making sure others do not feel the same. Also, when we participate in another school's project we are learning the process which they are using and then can judge what we should be willing to expect as we compare that to what we were willing to do. I believe it is important for teachers and students to experience some success and understand the way it works before running the risk of being discouraged because the major project does not unfold as it was planned. This is a radical change from my original view as evident in the SchoolNet Application form submitted in November 1993 (see Appendix I, Section 1, p. 138). This form has been included as a sample application. However, for future applicants I would recommend establishing more realistic expectations for the first year.

Along with being flexible and realistic, we must take in to consideration that there is a lot for the teacher and students to learn. This important step cannot be bypassed when committing to telecommunications projects. We must allow ourselves and our students time to explore and become comfortable before plunging in over our heads.

In keeping with this, teachers and students must be willing to be flexible enough to modify the project or activity as the situation dictates. If one anticipated needing twenty schools to participate but only hears back

from ten, a plan must be in place to find more schools or to work with the participants available. If the school does not have e-mail, it is important to be able to find an alternative activity so that the Internet access is still being used. There are an incredible number of resources out there that will add to our curriculum. Not only do teachers need to be flexible in what they do in the classroom they must also be flexible in trying new ways to do it. There has to be a shift from the role of expert to facilitator. This does not happen over night and must be carefully planned out so that it is successful. It does not mean that at all times the teacher must be in that role. At times teachers do have to take a more active role because they are the expert.

I would highly recommend establishing contacts early in the year. As the literature reports, there is a higher chance that participants will complete a project if they have committed early. This is also important so that there are not any surprises. If the details are worked out early, all participants have the chance to make sure that their views are represented. If an agreement is not possible, very little extra work has been done. Lots of time remains to complete an alternative plan of action.

Lastly, the Internet is a global community. If one runs into problems, ask for help. I have always been very fortunate in that whenever I am needing help I have been able to write to someone who seems to be able to provide an answer. I have written to schools that have an address listed on their homepage to ask about posting homepages. Within a few hours I have had a response. Do not hesitate to write a stranger. They have the choice of responding. I have finally learned not to spend a lot of time trying to figure out why I cannot get logged on only to find out hours later that the system was down and it was not me at all. Establish contacts or a support group with which to share your successes and frustrations. We no longer need to feel the

professional isolation that has often been a drawback of our profession.

As a result of my study, I would recommend that resources be made readily available to teachers interested in becoming involved in projects on the Internet. This is essential if the amount of frustration that educators are experiencing is going to be reduced so that they can experience success with their students. Some of the barriers cannot be overcome without funding. For instance if more phone lines are not made available we will be forced to have a limited number of stations accessing the Internet at one time and we will have to be flexible enough to work around busy signals. There are cost effective means to deal with the teacher isolation and accompanying frustration. Focus groups can be established online with electronic mail. In this way educators can retrieve their mail at off times and when they have the time. Another way is to provide a means of sharing others findings and suggestions. We do not have to reinvent the wheel but should be capitalizing on the technology available and using it to our advantage. This study has provided me the experience to develop and contribute two such resources. The following material provides suggested guidelines for conducting collaborative research and a multimedia resource for teachers to use as an aid for accessing the Internet.

1. Recommendations

When I embarked on this project there were very few resources and guidelines specifying how to conduct a collaborative telecommunications project. One of my desired outcomes was to analyze the process of doing a collaborative research project with grade eight students using telecommunications so that it could be used as a reference for other teachers

wishing to undertake a similar project. With this in mind I recommend the following step by step instructions for teachers.

1.1 Process for Conducting a Collaborative Telecommunications Project

1.1.1 Define the Problem

To be effective telecommunications must not be an add on to our already packed curriculums but must replace something we are already doing by doing it better. If the topic chosen is broad enough, many groups can each study a different aspect of the same topic and together they may develop an explanation for the findings. This then encourages collaboration within the classroom as well as with the participating schools.

1.1.2 Establish Participating Group

Very early in the project (and school year) it is essential to send an introductory invitation for participation to the schools (see Appendix I, p. 148 and III p. 175). If this is done too late in the year, many teachers will not have enough flexible time to complete the project. I have found that lead time is essential so that teachers can plan ahead and possibly identify a group of students within the school who can complete the projects on behalf of the school. Other ideas for posting the project are available on SchoolNet in the project section. One can post to the *SchoolNet Newsgroup* in the project section. One can also join other groups such as *KIDLINK*. If one has groups targeted, the white pages available through SchoolNet may be used to get addresses. I had far better luck when I wrote directly to the

schools asking them to participate. This is far more time consuming, however the results made it a feasible alternative to general postings.

The project posting from March 15 illustrates a format that was well received by the SchoolNet Support Group for a collaborative project (see Appendix I, Section 4, p. 154). The response we received from SchoolNet is also included for further reference on posting projects (see Appendix I, Section 5, p. 158).

The first year we did this study we kept track of the interested schools on a large Canadian wall map. We would use push pins and labels to identify the schools working with us. Student groups could add their name to the label to show which group is serving as the liaison for each school. Since we did not want to overwhelm the schools with countless e-mail messages, we compiled everything to allow one representative group to keep in touch with a school and relay messages. This group was then responsible for gathering the information from the school and then ensuring that the groups received their portion of the information.

Appendix III (p. 175) is the complete package we sent to schools our first year conducting the study. This package was followed by the student letters. In a comprehensive study involving many components, I think it is necessary to be very specific about expectations. This package was personalized for each school so that the coordinator would only have to read through it and photocopy enough for each participant.

1.1.3 Preparing the Survey

Once the surveys are written by the individual groups, a few individuals can edit and organize the survey so that the respondents do not have to answer the same question repeatedly. Establish a Part "A" that can be answered once and then distributed to all groups and then a Part "B" that is a compilation of all other questions organized around themes so that it is easier for the participants to answer. If there are general questions that need only be answered by one person at the school put them together at the beginning of the survey with a note explaining the specific instructions.

1.1.4 Receiving Responses

Once the responses start to come in the liaison group must be able to share the information with the other groups. One way this may be done is to make enough copies for each group to have one. If this uses too much paper, the liaison group could make an extra copy to pass among the other groups or to cut up so that each group receives the answers to their questions only. They must be sure to record on the slip of paper the name of the school responding.

Each group must compile their own responses. I would recommend doing this in a spreadsheet and converting the information to graphs that can be exported to a word processing document or a multimedia presentation program such as HyperStudio. The groups may realize that they have not found out everything they required or that some answers need clarification. If this is the case, they should then write another

set of questions to send to each school.

Once the information is complete, the students should write to their schools to thank them for participation and to let them know when they will hear the final results.

1.1.5 Reporting findings

Once the information has been summarized and a final presentation of the findings has been prepared, each participating school must receive this feedback. If your school has a web site, findings could be posted there for the participating schools to view once they have been notified of the address. This final step is the most important. It provides a large audience for students which should encourage them to do their best work. It also allows the participating schools the opportunity to see where they stand and how the information was being used.

1.1.6 Group Multimedia Presentations

If each group is doing one aspect of the presentation guidelines must be in place so that it will look complete and coordinated when it is done. I instructed each group to have at least 6 cards: a title card, introduction, two cards of information, a conclusion and credits. Each group member was to choose a card to complete and then the first ones done were to help the others. The students used a piece of manila tag to plan the layout of their card and the information it would contain. The group member who was done first would then work on the computer first with the help of one of their peers who had made an effort to learn the program in advance or myself. This

student would help the second person. This chain reaction was essential in ensuring that all students had help close by so that they did not become frustrated or waste valuable time.

After viewing the presentations I know that it is necessary to provide more guidelines to the students for developing their HyperStudio presentations. I would not want to provide so many that it detracts from their creativity but some standards such as font size and buttons for moving between cards must be specified. It was also very apparent that they had not spell checked their work. To remind students of this step I would provide a checklist that they must complete each day. I would also ask for a peer to sign that they had proof read it as well. In this type of situation it is impossible for me to do that step while troubleshooting problems that the students are encountering.

1.1.7 Classroom Organization

Collaborative telecommunications projects do take a considerable amount of time. The class must be structured in such a way to accommodate the sporadic responses as well as the varying amounts of time required by the students to learn the programs and develop their projects. As mentioned, I allowed the students to chose their own groups for the long term project. Even with that, they forget who is in their group, their disc numbers, what phase they are on and task responsibilities. I found it necessary to keep track of the student groups, topics and discs on a poster that was placed on the classroom door (see Appendix IV, Section 1, p. 188). I wrote the disc numbers on the discs because the students would put names that only they

would recognize. I also stressed that they must save their information and presentations on the disc under a name that I would recognize. I kept the discs for each class in a holder that only I had access to. No groups from any class could share a disc. In the future I would also collect their journals each time we used them and keep them in the classroom. Each day, I would recommend having the students record what was accomplished and what they must do the next day.

For the days only some students need computer time, I would go on with the unit we are covering and provide the students on the computer with a list of due dates and missed assignments. If they do not keep up, they lose the computer time. The lessons on those days would be structured so that the work can be done without science lab equipment.

I would recommend setting standards as a class and then providing this information in a checklist for each group (see Appendix IV, Section 1, p. 188). This same checklist can then be used to establish criteria for evaluation of the end product.

1.2 Teacher Resources

Through my own observations and the discussion that took place within the focus group I am very aware that teachers are frustrated with the isolation they feel getting on line. This is ironic since the value of the Internet is its inherent ability to reduce this feeling of professional isolation. Ideally, inservice would be provided for key teachers within each district or school which would be followed up by online discussion groups as well as face to face inservices

throughout the year. You cannot pass out the discs and expect the teachers to be able to figure it out on their own. The feedback from the discussion group was in favour of having a site based expert. With cutbacks in education I realize that most schools would not have the luxury of having a technology expert on staff. I found it very disappointing that many schools had the access to Internet but did not know what to do with it. For this reason I felt that it was necessary to prepare a resource that teachers could use at their convenience which would provide them with easy to follow instructions on how to use the basic resources. I have provided a video with the intent that the viewer watches the video while working on the computer. It would then be possible to try things at the time and pause until a comfort level is reached before going on. To aid in this process and to also provide a list of useful sites I have prepared a list of science resources on a homepage. This way teachers do not have to "waste" valuable time looking for useful sites but will have many saved on their computer (see Appendix VII, Section 2, p. 215).

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APPENDIX I

SchoolNet Documentation

Included in this Appendix are:

1. SchoolNet Application
2. SchoolNet Project Summary-May, 1994
3. SchoolNet Project Posting-December 3, 1994
4. SchoolNet Project Posting-March 15, 1994
5. SchoolNet Support Group Feedback
6. SchoolNet Project-Assessment Report-June, 1995

SchoolNet Application Form
November, 1993

Please answer the following questions as briefly as possible using extra sheets if necessary (maximum of 2 pages):

1. What is the student population of your school?

   734

2. What grade levels are represented in your school?

   This year we have grades 6-9 inclusive; next year we will be a Middle School with grades 6-8 and an estimated student population of 600-625.

3. What types of computers and operating system software does your school use? Please be specific with regard to hardware model and software name and version number.

   We have two Macintosh labs, but hope to have one updated this year. We have one Macintosh LC.

4. What type of modems and communications software do you have?

   Supra 9600 baud modem
   Software: ClarisWorks 2.0 communications module

5. At what baud rate do your modems transmit?

   9600

6. As a measurement of the project's success some projects will be monitored. Monitoring will look at how students and teachers are utilizing the services of the project. State your willingness to serve as a monitored school.

   We would gladly serve as a monitored school. We strongly feel that we (teachers and students) could learn greatly from having an overseer. Thus, both students and teachers would have a more rewarding learning experience.

7. Are you currently participating in an electronic network? Which one? Please describe briefly, the number of schools and students involved and what activities you use it for ie., applications for administration purposes, educator support, learner support, etc.

   NO

8. Describe in detail the pedagogical approach that will be applied to the project.

   We are firm believers in the benefits accrued to students and staff via the interdisciplinary approach to learning. Hence, staff and students from the following subject areas would be involved - Science, Social Studies, Environmental and Outdoor Education, Mathematics, Language Arts, Health, and Ethics.

   Students would work cooperatively as well as independently. We would seek feedback and information from other schools linked to the SchoolNet project. We would also endeavour to enhance this innovative curriculum experience by seeking guidance, assistance and direction from personnel at Red Deer College, an institution we are presently courting as a Partner For Progress. A statistical analysis of the results would be undertaken; this would assist us in determining if our hypothesis were accurate. The findings would result in ideas for further research and project follow-up. Results would be shared to all users and, hopefully, would be published in such a manner that other professions, individuals, etc., could benefit from the study. As data comes in, the students will organize it and present it on the map in the library. They will examine the patterns and look for discrepancies and then develop a new set of questions, if necessary.

9. Describe how you would utilize the opportunity provided by SchoolNet to promote improved learning in your school.

   This opportunity would indeed stimulate learning in our school. The fact that this would be an innovative approach with a definite hands-on orientation would not only benefit the student participants, but also excite the adult leaders. The opportunity to communicate electronically with students and adults Canada-wide and, hopefully, internationally as well, would definitely enhance learning, motivation and interest. Students will definitely learn the value of technology for research, but will also recognize it has limiting features. A project of this nature could possibly lead to school visitations, pen pal opportunities, Science Fair ideas, and in general a more comprehensive understanding between individuals, groups, and schools across the country. A greater understanding of the benefits of the interdisciplinary approach to learning would be an intrinsic benefit. Participants would be further motivated "to be the best they could be" as they would be cognizant of the fact they had a cross Canada (and possibly international) audience following their progress.

   Students will develop a greater understanding and compassion for problems others are experiencing in different parts of Canada such as fishing in the Maritimes, logging industry in British Columbia, acid rain in

southern Ontario, and the separatist movement in Quebec. The participants will be able to make more informed decisions due to the opportunity of networking with students and school across our country.

What with our country facing economic adversity in all sectors of the community, this opportunity would enhance learning through the process of sharing - a real bonus for all concerned!

10. Describe in detail how your project would enhance the achievement of the Alberta curricular objectives within the given area of your project.

We are moving towards the Middle School concept of integrating our curriculum. This project will provide an excellent opportunity for this to happen. The regions of Canada can be researched by learning from their peers across the country. Current events can be discussed first hand with the people that live in the area and often before it has even hit the news. This learning can easily be applied to many areas of the science and social studies curriculums as we study environmental issues dealing with water quality, distribution and availability; wetland protection; acid rain; ozone depletion and the fishing and logging industry. Hearing about these issues in the news is often too far removed from our students. If they can communicate with someone who is actually affected by these issues, they will have a better understanding and hopefully realize that it really is an issue and concern and as a Canadian citizen we all have the duty to act responsibly.

The science curriculum is designed to integrate science, technology and society. The project that we have proposed addresses these three themes. We plan to examine the incidence of asthma nationally. This topic is very relevant to many school aged children and provides the perfect opportunity for students to see how technology and science can work together to solve a problem that affects and threatens the lives of many Canadians. The students will use the technology to collect data so that they can interpret and examine patterns and they will perform and pass on experiments that may prove or disprove their hypotheses. The students will use the scientific method to solve a problem. By linking up with experts in the field, our students will be provided the opportunity to receive feedback and ideas for further study. This would hopefully spark an interest to pursue further education in the field of science.

Our present program is weak in the area of technology. If we became involved in this project, the students would learn that technology is an important tool for learning, researching and communicating. It will also provide us with access to many resources that we would otherwise not be able to share with our students.

Using the SchoolNet in our classrooms will be invaluable in developing the attitudes that are essential to education.

Critical Thinking ——— how can the patterns be explained
Open-Mindedness - working together to solve a problem and looking for more than one answer
Curiosity———————— can we explain the changes around us
Confidence————— passing on their own findings and learning that others are interested and willing to help
Responsibility——— to follow through on a project and to help others
Respect———————— for the rights of others using the network and of the subjects that are providing information and data for the experiments
Citizenship————— we must look at issues from a much broader perspective than just how it affects us

All students will understand the importance of reporting accurate and complete information; working together to solve a problem: the importance of having input from a wide variety of sources and the need to cooperate and help other schools with their projects if they want to receive help from others.

Throughout the project we will be developing the science inquiry skills through practice and "hands-on" experiences. Students will need to examine the data they collect and identify patterns and explain discrepancies. They will need to propose new ideas and design experiments to test them. Their experiments must be clear and concise so that others can emulate them. This opportunity will be invaluable because students generally do not have others repeating their experiments. They will also learn that knowledge is constantly changing. What we know know about asthma compared to ten years ago and five years from now will vary greatly.

11. Describe in detail what project(s) your school would be prepared to coordinate on the network specifying the lead teacher, the subject area and objective, the grade level(s) to be involved, the time during the year when the project would be run and its duration, etc.

The purpose of the project that we are proposing is to learn more about asthma. We feel that this is an extremely important topic as well as relevant to our students. Many of our students, as in any school, have asthma and are sometimes forced to "sit out". Research does indicate that asthma is becoming a more serious problem and is threatening the lives of many Canadians. We feel that the number of asthma cases in our area is abnormally high. We would like to compare Central Alberta to other regions of Canada to find out if this is in fact true and if it is, why.

As teachers, our objectives for the students are to learn to use technology as a tool for research, to learn the importance of the science inquiry skills when trying to solve a problem that affects a significant proportion of our society and to learn the merit of working co-operatively to solve a problem. We also plan to use this as a theme for an interdisciplinary unit for grade eight. The information that these students gather will then be used as a springboard for further study by the grade sevens and nines. The scope of this project is so broad that it lends itself to a project in which the whole school can become involved.

We plan to start out small so that the teachers can learn to navigate in the SchoolNet by helping out a small group of students with their science fair projects. We plan to have a group of students focus their science project on environmental illness and asthma. These projects are due the end of January. Their projects will be shared with all of the grade eight students and the SchoolNet. From here we will have students examine the information and then draw their own hypothesis to investigate. We will have several small groups working on different aspects of the issue: Why is the number of asthma cases rising?

The small groups of students will form their hypothesis and then develop a plan to test it. They will also elicit the help of students across Canada (and the world) to gather the data they need. Once the data is collected and analyzed the students will post it on the large map in the library so that their grade mates can see the results and possibly use it for their own research. They will examine the patterns and look for discrepancies. They will then need to form new ideas and design experiments to test them. They will also be able to draw from the experts when they need to know they are on the right track or are overlooking something.

After each group of students has done their research and collected results we will have a sharing session where all groups will have the opportunity to present their results. Conclusions will be drawn and a summary will be prepared for sharing on the SchoolNet. We would like to use the network to collect data from across

Canada and the world to first of all map the asthma cases to see if some areas are extremely high while others are low. From that information groups of students will form a hypothesis to test using the network to gather results.

The following is a partial list of purposes for experiments and research that the students may choose.

Purpose:

To find out if Central Alberta has an unusually high rate of asthma cases.
To find out if environmental factors cause asthma.
To receive information from experts on environmental illnesses.
To make a plan of action on how we can make schools a healthy environment.

* Students may add to or modify this list depending on their interests and concerns.

Hypothesis:

Central Alberta has the highest rate of asthma in Canada.
The local industry affects the number of asthma cases.
Kids are more apt to have asthma if their parents smoke.
It is better for asthma sufferers to live in a dry climate.
Stress and exertion triggers attacks.

Students may design experiments to measure the lung capacity of students with and without asthma. They also might choose to develop a survey that will gather a wide range of data so that they can look for a pattern. They may see that the majority of students with asthma live with someone that smokes and in a city. They would then need to test if one or both of these factors have an influence.

We feel that this project is exciting because we can easily see how the disciplines fit together to provide a relevant, well rounded learning experience for our students. For math class, they will have the benefit of proposing a research question and sending it to many schools for input. They will get back enough reliable results to analyse the data and draw conclusions. They can study the statistics and graph the information as well as looking at ratio, proportion and probability.

For the social studies classes this project will be invaluable because they are not talking about outdated issues from the text but are finding out the effects that industry, population growth and environmental issues are having on us right now. They can ask questions about the issues and get answers from their peers across the country. They can use the information they gather to make informed choices for themselves by using this as a model for working through the decision making process.

This topic is so current and relevant that the students will quickly become aware that you have to keep up with the constantly changing information. The idea of having access to the newspapers will help make them aware of the importance of checking a variety of sources and that the newspaper is a good resource for current information.

Suggested Activities:

GRADE 7

1) Science students design an experiment to collect results on lung capacity for the SchoolNet. They will also attempt to test factors such as stress and exertion and correlate this to the triggers of an asthma attack.
2) Health students will collect data to see if smoking or second hand smoke is related to asthma. They will also prepare a display to show what asthma is and the body systems affected.
3) Social studies students will compare the effects industrialization has had on the health concerns of the Japanese to the effects it has had on us.

GRADE 8

4) Social studies students will examine the regions of Canada and make recommendations on the best place for asthma sufferers to live.
5) Science classes will have a guest speaker to learn more about airborne illnesses and pass on their information through SchoolNet and ask for feedback from other experts.
6) Health students will examine ways to recognize an asthma attack and look into non-prescription ways to control asthma.
7) Ethics classes will examine the issues involved in communicating through computers, the rights that all users have to their privacy and the responsibility that each user has to not tamper with information that is not theirs.

GRADE 9

8) Social Studies students will collect data to see if the industry in the area affects the number of asthma cases.
9) Science classes will collect data to see if asthma is passed on genetically.
10) Health students will report on asthma medication, how it works and different prescriptions.

CROSS-GRADES

11) Grade 7-9 math students design a survey to collect data to show the school population and the asthma cases.
12) Grade 8 and 9 math students analyze the results to see if there is a significant difference between regions.
13) Language arts students may become pen-pals with someone who also suffers from asthma so that they can share concerns and problems that they have encountered. They will also need to write a summary for this project.

Optional Cross Grade Extension:

Design a school that will reduce the risk of environmental illness. Must be energy efficient.

Science Units covered:	grade 7	-	structure and design
	grade 8	-	environmental interactions
	grade 9	-	heat transfer

Timeline:

1) November 22-January 25 —— Science fair project with a partner access SchoolNet if we are on line
2) January 31———————— Present project to classmates
3) February to April———————— All grades and subjects begin to form hypotheses and collect the data for analysis in small groups (results will be displayed in the library upon discovery)
4) May 15———————— Conclusions made by small groups of students
5) May 30———————— Presentation of results to students and on the SchoolNet

Over the next 5 years, students will continue to collect data to see if asthma is on the increase.

Principal: Mr. Barrie H. Wilson
Signature: _____
School Project Leader: Ms. Sharon Lewis
Signature: _____
Jurisdiction Project Leader: Mr. Dick Pawloff
Signature: _____

2. SchoolNet Project Summary
May 1994

School: Eastview Community School
Red Deer, Alberta
Project Leader: Ms. Sharon Lewis
Principal: Mr. Barrie Wilson
Jurisdiction Project Leader: Mr. Dick Pawloff

Project Title: Canada Wide Asthma Study

Purposes: To find out why asthma is becoming more prevalent.
To find out why Alberta has a higher rate of asthma compared to all other Canadian provinces.

Description: The grade eight students of Eastview Community School used SchoolNet to solicit other pilot schools to participate in their survey. Once schools agreed to participate they were sent the asthma survey package. They were asked to return their completed surveys to the Asthma Research Centre in Edmonton, Alberta. The researchers compiled the results and returned them to the schools with a lesson plan. Our students followed up the survey by e-mailing the participating schools to ask their own questions regarding weather, industry, geography and other topics that they felt might be influencing factors. They also did searches of the InterNet looking for information. Once the data was compiled and patterns analyzed the students prepared a multimedia presentation to share their findings.

Who was involved?
Four classes of Eastview Grade 8 students worked on the project.

Resources from the SchoolNet
19 Schools across Canada-15 from Alberta, 1 British Columbia, 1 Labrador, 1 Manitoba and 1 Nova Scotia
Ottawa FreeNet-Asthma Special Interest Group

Local and Provincial Resources

Asthma Research Centre in Edmonton, Alberta provided us with support. Dr. Patrick Hessel and his research assistants have met with myself to help with our research. They have answered student letters and sent out information to all participating schools. They have also compiled the data so that the students could analyze it and look for patterns.

Alberta Lung Association-Mrs. Colleen McPhee spoke to the classes and gave us assistance on accuracy of the information.

ARS Vitalaire-Mr. Marco Pilon spoke to the classes about medication, treatment and control.

ResPro-Mrs. Lois Morrical held a workshop at our school for the asthmatic students so that they would better understand their condition and learn to control it.

NovaCor-Mr. Bob Martin spoke to the students about the government guidelines that they must abide by that controls the plants emissions.

Alberta Agriculture-Mr. Hartman spoke to the students about pesticides and herbicides and the harmful affects they may have on neighbouring communities.

Ann Dow spoke to the students about environmental illness.

Mr. Jim Hall of RDTV came to talk to the students about reporting the weather and the systems that affect us in Red Deer.

RDTV came to do a short news segment on the SchoolNet system.

Red Deer Advocate wrote an article on the SchoolNet as well as reporting the asthma presentation by Lois Morrical.

Time: We started the project January 25 and will have completed the first phase by June 22.

Rationale: We chose to apply for this SchoolNet Project because we felt that our students would benefit greatly from the opportunity to communicate with their peers and professionals across the country. We used this opportunity to stimulate interest in learning more about science research, problem solving and using the computer. We felt this was an ideal opportunity to integrate curriculum across the core subject areas. It also helped us show our students a practical and valuable application of integrating science and technology to analyze a societal problem. This was very applicable during health care cutbacks and rising health care costs. The key to this issue is education. If people are made aware of how they can reduce their own medical needs, it will reduce the high costs.

Objectives:

1. Integrate curriculum
2. Communicate with peers across Canada
3. Use the computer as a tool for gathering data and information
4. Provide a practical application of science, technology and science working together
5. Provide an opportunity for students to learn more about using the computers
6. Share results with parents, peers, teachers and school board members
7. Cross-grade integration

Meeting Objectives:

One of the major drawbacks of our project I felt was the delay in start up. I had anticipated being on line in January. Unfortunately, we were not able to use the e-mail system until mid-February. We did use the list of participating schools in Alberta to fax other schools and ask them if they would participate. We mailed out the packages. I was finally able to post our project to the SchoolNet newsgroup in March. I did not receive any response this way. I then tried to get a list of addresses for participating schools across

Canada. As I found addresses, I wrote to them to ask for their help. I found that the people using the system were extremely helpful and friendly. However, I never heard back from the majority of schools I contacted. I later found out that some of this was due to the fact that some of the people that I was writing to did not have the time or their students had not been taught how to use it or that they were very unsure and needed more time to learn the system themselves.

I felt that I was under pressure to get started on our project even before I had had the time to learn the system. The workshop that we attended January 25, was somewhat informative, however I was very disappointed the the system was not in operation so that we could actually learn how to operate it and navigate InterNet. The video-teleconferencing was an interesting experience, however, I question the effectiveness. It was very difficult to read the screen and to know what was going on.
I feel that another method of instruction would have been more practical.

In February and March it was very difficult to set up instructional time on the SchoolNet. Often we would prepare to work on it and find out that the number was busy and we would not be able to get on. At times it would take several hours to get through.

1. I feel that we achieved the goal of integrating the math, science, social and health curriculums. The students did find out more about different areas of Canada. However, I felt that we did not have as much communication with other schools as I had hoped.

2. The students involved in the project did write to all of the schools participating in our survey to ask them more questions about their community. Many of the schools did not respond. This was very frustrating for the students since their own research and project depended on this feedback. In this way our project is not done. There does need to be further follow up so that the students can analyze the patterns more extensively.

3. We did use the computer as a means of gathering data. We also used the Ottawa FreeNet extensively. We found an Asthma support group there and were able to make contact with some valuable resource people. Mrs. Elizabeth Strutt from Nepean, Ontario sent us a package that she had developed for making Board presentations on the importance of making sure that schools are not contributing to environmental illness. Two students in my class used this package to design a school that took these factors into consideration.

4. The three themes of the science curriculum were definitely tied together using our project.

5. The students have learned a lot about computers. Many of them had never used a Macintosh Computer or used word processing. They now know how to use word-processing, spreadsheets, modem, e-mail, graphics and HyperStudio.

6. We will be holding a parent night so that the students can show their parents what they have accomplished. A group of students will accompany me to a School Board meeting June 22 to show how results of their project.

7. We were able to do some cross grade integration but not enough. a group of grade nine students helped compile statistics from our own survey as well as writing to schools to find out more about their local environment. We ran out of time to share the results with other grades so that they could prepare a meaningful project. Next year we will pass on the results from this year to other classes so that they can develop the unit further. We will also continue to collect data. The grade eights are still working on their projects right up until finals.

The project exceeded my expectations in many ways. In ten years of teaching I have never undertaken a project that stimulated and motivated my students as much as this one. It was fantastic to see the student involvement.

Students that would normally dread science and avoid teachers were initiating conversations in the hall to find out when they could come in to work on their project. This was true for high and low achievers alike. Students were able to construct graphs using their own data. They were able to decide what type of graph was appropriate and meaningful for the data and discard those that were not. We finally increased the number of girls using the computer facility. I found that it was mainly boys congregating at the computers to play games. Early in the project it was the boys taking the initiative to come in on their own time to work. Girls did start getting more involved and confident on the computers as well. a highlight for me was watching the kids become the experts and offering to help one another out. They would share their findings and store them on the computer and then offer them to the other students. It was a truly cooperative project.

I was also able to provide students in our two enrichment programs to have some time to explore and use SchoolNet. They found addresses so that they could make contact with other students for key pals. Many of the grade nines enjoyed the conversation option.

We also had a grade 7 science option participate in the Safari Expedition from Vancouver Island.

Status as of May 30, 1994

I feel that we have just barely touched the surface of the project. I strongly believe that this project is valuable and needs to be continued. We are working with the Asthma Research Centre to produce a teaching package that will accompany the Year 2000 No Smoking Campaign by Alberta Lung Association. To be a truly effective teaching tool we need to expand the project to involve more schools from coast to coast and North of 60. It would also be advantageous to have a data base that is gathered over a few years so that we can analyze the patterns to see if Asthma is on an increase and to compare it to industrial and weather changes that occur in those areas.

One of the merits of this project is that it provides the researchers with a source of information and data that they may not have the money to gather otherwise.

Suggestions for future projects:
In the future I would highly recommend a teacher inservice. Time must be spent exploring, however it is very frustrating and time consuming. I also would have valued the opportunity to learn the potential and capabilities so that I would have a better idea of how I could best utilize the system.

In the beginning the traffic on the line was so great that it was difficult to access it. Now that people are spending less time it is not as big a problem. However, if another project starts up it will be a problem again.

Time must be spent getting to know the system before undertaking a project and teaching our students. The timeline this year was very rushed considering the initial problems getting the system online.

I felt that the support was there when we ran into problems and it was easy to contact the organizers.

3. SchoolNet Project Posting
December 3, 1994

Available online at
gopher://SchoolNet.carleton.ca:419/00/Projects.dir/examples.dir/Science.dir/asthma_project

Attention all SchoolNetters:

Eastview Community School in Red Deer, Alberta is doing a Canada-wide study on asthma. The first step is to have as many schools participate by completing their survey. These results will be analyzed by Doctors in the field to help them learn more about this growing problem. Their findings will be passed along to you. Their students will also contact the schools to learn more about your area and the types of triggers that are bothering asthmatics. They will be asking questions about your school, community, local industry, weather and environmental problems. If you are interested in learning more about asthma and helping us out, please contact Sharon Lewis through this news group, e-mail or fax. Their e-mail address is eastview@edc.gov.ab.ca and their fax number is (403) 342-7638. She looks forward to hearing from you soon.

Thank you for you participation,

Eric Sabourin,
SchoolNet Support Group

4. SchoolNet Project Posting
March 15, 1995

Available online at gopher://SchoolNet.carleton.ca:419/00/Projects.dir/Join.projects/asthma

The purpose of our project is to learn more about asthma. In Central Alberta we have an unusually high number of asthmatics and that rate is steadily climbing. Canada has the second highest number of asthmatics in the world. Currently, 1.2 million Canadians do have asthma and researchers predict that 1 in 3 people will experience asthma at some time in their lives.

The researchers still have many unanswered questions about asthma and its causes. Our students wish to help the Alberta Lung Association and the Alberta Asthma Centre with their research so that we can help educate Canadians about asthma.

To start our project we need your help. We have sent you a copy of a survey that we would like your students to compiete. The survey comes in two parts.

The first part is general questions that we need one person to answer for us. It does require a survey of your students to find out how many do have asthma. As well there are some general questions about your weather and area. The second part can be answered by as many students as you would like to survey. They should be done by asthmatics and non-asthmatics. We do require that at least 70% of the surveys be returned so that we will have valid results. Once you have collected the completed surveys return them collect via Greyhound to the enclosed address. The grade 8's will use this data to help form some conclusions about the causes of asthma. We will stay in contact with you to ask follow up questions and so that we can share our findings.

We think it is very exciting to be a part of a study in which the results will be shared with researchers in the field. Young people need to learn more about asthma and how to control it so that they can live healthier lives.

TIMELINE

March 15-Posted to newsgroup
March 22-Please notify us if you wish to participate or have further questions.
March 15-April 7-Collect Data (please let us know if you need longer)

April 7-10-email us the results (slewis1@eworld.com)
April 10-31-we will compile the data
May 1-Our findings will be posted to the newsgroup. The
HyperStudio stacks can be sent to you if you wish,

We look forward to working with you and your students. If we can help you in any way with your research, please let us know.

Sincerely yours,

Sharon Lewis
slewis1@eworld.com

To whom it may concern,

Hello, our names are Lucy Underwood, Carmen Snelgrove, Lenke Hegedus, Sarah Reid, and Telisa Phillips. We are in grade 8 at Eastview Community School in Red Deer, Alberta. In our free time we like to do a lot of different things that include skiing , skating, playing soccer , dancing and be with our friends. In the last couple of month's, we have been doing a Canada wide asthma study because we want to find out about asthma and it's causes and effects. Mainly our group is trying to find out if a certain race is more prone to asthma than any other. We would appreciate it if you would help us in doing this by answering and returning our school wide and individual survey questions. so that we can compare your information with ours and get a more accurate answer to our question. This would help us a great deal.

Sincerely,

Lucy, Carmen, Lenke, Sarah and Telisa

GENERAL QUESTIONS

1. How many people go to your school?

2. Where is your school ?

3. What grades are in your school?

4. How many boys _____ and girls _____ in your school ?

5. How many people have asthma ?

boys_____ girls_____

6. What is your climate like ?

7. Is it humid ?

8. How many months a year is there snow ?

9. Would you consider your city to be windy ?

10. Where is your city ?

11. What part of the country are you in (eg.- mountains, coast, prairie etc.) ?

12. What is the size of your city in square kilometres? The population ?

13. Does your city have a major industrial site? If so, what are the main industries in the area?

The following questions are concerning people with Asthma who use medication.

1) When do you take your medication?

2) What medication is the best?

3) Which medications have side effects?

4) Which medications cost more?

5) How many people take their medication with them everywhere the go?

6) How long until the medication affects the body?

7) Where do you buy your medication ?

8) How often do you use your medication?
Once a week or less __ Three times or less __ More than three times__

9) Do you have pets? List how many of each.

10) Did your doctor encourage you not to have pets?
What was the reason given ?

11) Does anyone in your immediate family have allergies to pets? If so, who?

12) Do you know any animals with asthma?
13) If so, what are their allergies?

Asthma and Sports:

1. Do you have asthma? If so continue.

2. What sports do you participate in?

3. Do indoor sports affect you worse than outdoor sports?

4. When you do outdoor sports do you experience— dizzy spells, headaches, freezing, trouble breathing, coughing, or cramps ?

5. SchoolNet Support Group Feedback

Date: Thu, Mar 16, 1995 1:59 PM EST
From: mcampana@SchoolNet.carleton.ca
Subj: Asthma Project
To: SLewis1

Hello Sharon,

I have received your project and may I commend you on a very thorough and interesting idea!

I will post the project to the SchoolNet listserver for you, as well as to the 'can.SchoolNet.projects.calls' newsgroup. I suggest that, for some practice, your students post it any other newsgroups they find appropriate. Below, I will outline how you may go about doing this.

First, however, I would like to request that you e-mail me your mailing address. In the body of your project, you allow for students to 'snail-mail' you their findings, however, you do not provide your mailing address.

If you would like, I can also post your project on the SchoolNet gopher, and then post your eventual results. This will give others an example of how to do a project such as yours and will allow students to continue to access the information after the project is finished. Please let me know if you would like this done.

Some background on newsgroups

SchoolNet offers a variety of educational public discussion forums like the "can.SchoolNet.projects.calls" newsgroup. In order to access this newsgroup, and to participate in on-line discussions, you can either use a newsreader or the SchoolNet Gopher.

You may or may not have access to a newsreader (like "tin" or "trn"), depending on the nature of your Internet account. If you do have access to a newsreader, simply search through the list of available newsgroups according to a key-word (like "SchoolNet" or "projects"). All of SchoolNet's newsgroups can be found within the huge list of Usenet newsgroups. From within the newsreader, you can read and post articles to this particular newsgroup.

If, however, you do not have access to a newsreader, you can still

access the SchoolNet newsgroups through the Gopher (gopher SchoolNet.carleton.ca). Once connected to the English version of the SchoolNet Gopher, follow the path:

4. Electronic Innovators
5. Access to Newsgroups
2. can
3. SchoolNet

Within this directory, you will find English and French newsgroups dedicated to a variety of subjects, including "can.SchoolNet.projects.calls". Obviously, you have already done this, and are now interested in posting to one of our many newsgroups.

Again, if you don't have access to a newsreader, you can still post messages to any one of SchoolNet's newsgroups, by sending an e-mail message to the appropriate alias address. What we have done is set up aliases for our newsgroups, so that SchoolNet users who don't have access to a newsreader can still post messages. For example, in order to post a message to the "can.SchoolNet.projects.calls" newsgroup, send an e-mail message to:

can-SchoolNet-projects-calls@cunews.carleton.ca

(Note: Each "." in the newsgroup address has been replaced with a "-".)

Your message will be soon posted to this newsgroup, so that other Canadian and international students can read and respond to your questions and comments.

I hope that this information helps you. If you have any other questions, please write to me directly.

I wish you luck with your project, and hope to hear from you soon.

Regards,

Marco

—
M.L. CAMPANA Always remember the human.
SchoolNet Support Group

mcampana@SchoolNet.carleton.ca

6. SchoolNet Project
Assessment Report June 1995

School: Eastview Community School
City: Red Deer, Alberta
Pilot Teacher: Sharon Lewis

Project Title: Canada Wide Asthma Study

Project Description: The intent of this year's project was to have three classes of grade 8 students continue the project that the previous year's students started. With the help of Alberta Lung Association and the Asthma Research Centre, we intended to survey schools across Canada so that we could compare the incidence of asthma in Red Deer with that across Canada. Once we knew the average percentage of asthmatics in different regions of the country we planned to ask further questions to determine the factors in each area that may be contributing to asthma. The students would present their results to their peers and participants through a multimedia presentation using HyperStudio.

Participants: Three grade 8 classes at Eastview Community School as well as the Alberta Lung Association and the Alberta Asthma Research Centre in Edmonton.

Anticipated Timeline: The original timeline was to begin doing background research on asthma and learn to use the computer programs beginning in September. When SchoolNet came on line in October, the students would be ready with their surveys and invitations for participation. We anticipated using two to three months to collect the data, one to two months to compile the data and request further information as necessary and then share the results through SchoolNet.

Actual Timeline: The students did have their background research completed by the beginning of October. Each group had a letter of

introduction and survey questions prepared for October 15th the original date that SchoolNet was to be up and running. However, we did not have e-mail until late in February. We did post the project to SchoolNet in February and KidLink mid-March. Neither of these received any feedback from other schools. We tried to contact schools individually but did not have anyone offer to participate. We also prepared a write up to put on our homepage that was posted at two web sites and eventually Web 66. We did receive comments about the Homepage from schools around the world; however, no one volunteered to participate. The project was left at that point.

Rationale: We chose to continue our SchoolNet project because we did not complete all of our objectives from the previous year. We believe that students will benefit greatly from the opportunity to communicate with their peers and professionals across the country and around the world. We used this opportunity to stimulate interest in learning more about how technology can help scientists complete their research. This project integrated the three themes of the Alberta Science Curriculum: science, technology and society. It was our hope that students could study a practical and interesting topic to see how these themes fit together in their daily lives. The key to reducing the health care costs related to asthma is education.

Objectives:

1. To collect data that would be used by experts in the field.
2. Integrate curriculum.
3. Use the computer as a tool for communication as well as gathering data and information.
4. Provide a practical application of the science, technology and society themes.
5. Provide an opportunity for students to learn more about using the computer.
6. To share the findings with project participants, parents, community members and researchers.

Meeting Objectives: We did not meet our objectives for this project this year. The major block to our progress was not having e-mail in place. We started the project in September with guest speakers on asthma and conducting

research. The students completed their background study of what is currently known about asthma and then developed their own research questions aimed at filling in the gaps in the literature. They developed surveys, wrote letters completed a HyperStudio, multimedia presentation of what they had already learned by mid-October when we first thought that SchoolNet would be in operation. It was very difficult, if not impossible to maintain their interest until the beginning of March when we finally subscribed to a commercial e-mail provider. We did post our project to many areas that we felt would generate feedback but we were unsuccessful. This was getting very late in the year and I am sure that few schools would have time to get started on something so large without having planned for the time. The white pages was not working whenever I tried to get addresses so this was another road block. When we realized we were unable to complete our project we did move on to other things.

The grade 7 science class undertook a project to put the Red Deer and District Museum on the Internet. We went to the museum and took digital photos as well we scanned images and created a virtual tour with the notes that students took on the various exhibits. The students learned how to use HTML and the technology that we used to complete the project. We are currently working on a tour of Red Deer with grade 8's. The merit of this project, in my opinion, is that students are creating something that has the potential to be viewed by 1000's. This was a strong motivator. As well, they were highly motivated because it was very unique.

We did have other students use the Internet as a research tool. Our Strategies students used the San Diego Zoo database to collect information for their endangered animals projects and the grade 8 French students used the World Wide Web to access French resources and sites. Each class created a HyperStudio stack to share their findings.

Later in the spring it also became nearly impossible to get on line. Once the students and teachers were interested we tried to do some research but we spent a lot of time dialling and receiving a busy signal. We do not have

enough hours to accommodate these pitfalls. We must move on and find the information somewhere else. Many days it seemed that it was useless to try to access SchoolNet because it was typically busy from 7:15 to 5:00.

Current Status: Once again the project is on hold until we can begin very early in the school year. I am still very interested in completing the project and would like to work on it again next year.

Suggestions for future projects: I still firmly believe that schools need to be accessing the Internet. There is an incredible wealth of information and opportunities available. However, inservicing has to be built in. Too many teachers did not have the support in place to get started. I was able to get going relatively quickly but unless everyone can, we do not have anyone to participate in their projects. SchoolNet participants need to be better informed of what is going on so that we can modify or totally revise our projects if the necessary resources are not going to be available.

I would also suggest that schools start out small and be satisfied with learning how to use World Wide Web, ftp, e-mail and search tools before feeling pressured to spearhead a project. I find that there are a lot of opportunities to participate in projects but what we need is more schools to participate. If we are all conducting our own projects that leaves us very little time to participate in another school's.

I would also suggest that schools post their project very early in the school year so that schools have plenty of time to plan them into their schedules. The timelines must be very generous because it is very time consuming when one tries to compile students' data and information and then send it off via e-mail. When posting the project one needs to be very specific about what is expected and required. I strongly believe that the final step must be to share the findings with all participants.

APPENDIX II

Surveys and Consent Forms

Included in this Appendix are:

1. Computer Attitude Survey
2. Science Learning Inventory
3. Science in Society Survey
4. Computer Survey Results
5. Student Consent Letter
6. Parent Consent Letter

1. Computer Attitude Survey

This survey is optional. The results will be used to help me assess the effectiveness of using telecommunications to help us with the Asthma Study.

Please indicate your opinion about the following statements by circling the appropriate number.

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

1. I would feel comfortable working with a computer.	1	2	3	4	5
2. Computers will improve our society.	1	2	3	4	5
3. Computers are not very important to me for schoolwork.	1	2	3	4	5
4. The idea of using a computer makes me shudder.	1	2	3	4	5
5. It is easier for people to get a job if they know how to use a computer.	1	2	3	4	5
6. A person needs to know how to use a computer if they hope to succeed in today's world.	1	2	3	4	5
7. I get nervous when I have to use new technology.	1	2	3	4	5
8. Computer users have an unemotional view of life.	1	2	3	4	5
9. I will never feel comfortable if I have to use a computer in my work or career.	1	2	3	4	5
10. Computers have raised the quality of life in Alberta.	1	2	3	4	5
11. Computers are extremely frustrating machines.	1	2	3	4	5
12. Increased use of computers would give people more time to make better use of their capabilities.	1	2	3	4	5
13. Computers will make it harder for people to find jobs.	1	2	3	4	5
14. The ability to use a computer is as basic and necessary to a person's education as reading, writing and arithmetic.	1	2	3	4	5

15. I am very comfortable when I am working on a computer.	1	2	3	4	5
16. Computers are not very important to most people.	1	2	3	4	5
17. Material which is otherwise boring would be interesting when presented using a computer.	1	2	3	4	5
18. Everyone should know how to use a computer.	1	2	3	4	5
19. Computer users are insensitive people.	1	2	3	4	5
20. Computers are too difficult for the average person to learn.	1	2	3	4	5
21. Over the next decade, there will be drastic changes in the jobs people do and how they do them as a result of technological change.	1	2	3	4	5
22. Computers are mainly for people who are good at Math and Science.	1	2	3	4	5
23. Computers will be important for Canadians in their future work and jobs.	1	2	3	4	5
24. In school, we should be using computers more to help us learn.	1	2	3	4	5
25. It's only a matter of time before computers put people out of work.	1	2	3	4	5
26. Computers are a tool, just like a hammer or a saw.	1	2	3	4	5
27. Computers forget we are people by treating us like a number.	1	2	3	4	5
28. If technology continues to develop at its present pace, soon we will be out of work and computers will have taken our place.	1	2	3	4	5
29. Computers help us to be more creative.	1	2	3	4	5
30. In general, if we use computers to help us make decisions, human judgment would be improved.	1	2	3	4	5

*Adapted from R. S. Erickson (1993) thesis "Effects of a simulation in SCUBA instruction" and D. Touchings (1989) thesis "Teacher's Attitudes Toward Computers".

2. Science Learning Inventory

This survey is optional. The results will be used to help me assess the effectiveness of using telecommunications to help us with the Asthma Study.

Following are descriptions of several science learning situations. Read each description and decide if you agree or disagree with the statement.

Use this guide to help you choose from 1 to 5.

1 - this does not describe my science class
2 - this seldom describes my science class
3 - this sort of describes my science class
4 - this frequently describes my science class
5 - this very frequently describes my science class

1. I am able to make decisions on my own and decide how I will carry them out.	1 2 3 4 5
2. I choose and conduct my own experiments occasionally.	1 2 3 4 5
3. The science class spends time designing experiments which could be used to help find the solution to a given problem.	1 2 3 4 5
4. The science class spends time organizing, analyzing, and interpreting data collected in a given experiment.	1 2 3 4 5
5. I am given an opportunity to discuss my data, hypothesis, procedures, conclusions with my class.	1 2 3 4 5
6. I learn science in a manner similar to the way in which scientists do their work in science.	1 2 3 4 5
7. I am able to use the laboratory, classroom, library, the environment outside the school and other people as possible sources of information for my science studies.	1 2 3 4 5
8. While studying science I have an opportunity to act like a scientist a large portion of the time.	1 2 3 4 5

9. As I study science I am made to realize that I am learning a method that can be used to solve personal problems which may arise.	1 2 3 4 5
10. The class takes part in discussion of myths, superstitions, misconceptions, prejudices, advertising claims, etc.	1 2 3 4 5
11. I am allowed to pursue questions that may arise in the science activities.	1 2 3 4 5
12. The teacher shows concern for the development of positive feelings and attitudes in students towards science and learning science.	1 2 3 4 5
13. The students are expected to work towards their own answer to a scientific problem rather than have to get the "correct" answer which the teacher expects.	1 2 3 4 5
14. The teacher promotes respect and tolerance in students of diverse beliefs and values.	1 2 3 4 5
15. The teacher encourages students to come up with answers or views which they can support but which may be different from that of the teacher or classmates.	1 2 3 4 5
16. The teacher encourages students to obtain information for all sides of a controversial issue before making up their minds which side to support.	1 2 3 4 5
17. The students perform studies or parts of studies on their own with little or no help from the science teacher.	1 2 3 4 5
18 In class the students often analyze current newspaper or magazine articles to see what new scientific discoveries are being made and how scientific knowledge is being applied.	1 2 3 4 5
19. The students are given opportunities to learn ways of solving a scientific problem and how to apply them.	1 2 3 4 5
20. A wide variety of activities is used in lessons to solve scientific problems and to learn about science (examples: listen to the teacher, discussions, laboratory work, watch movies, work in the library, use the computers, field trips)	1 2 3 4 5

*As excerpted from Science Learning Situation Inventory (SLSI) by M. Nay and G. Gay (1989) and modified by R. Mrazek (1991).

3. Science in Society Scale

This survey is optional. The results will be used to help me assess the effectiveness of using telecommunications to help us with the Asthma Study.

Please indicate your opinion about the following statements by circling the appropriate number.

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

1.	Science is important in our everyday lives.	1	2	3	4	5
2.	In everyday life, science is not as practical as common sense.	1	2	3	4	5
3.	Scientific research should not get any of the taxpayer's money.	1	2	3	4	5
4.	I never use the products of science.	1	2	3	4	5
5.	Scientific inventions and discoveries have done more good than harm for mankind.	1	2	3	4	5
6.	Science is not important in everyday life.	1	2	3	4	5
7.	Science will have a tremendous effect on our lives in the future.	1	2	3	4	5
8.	Science exists for the benefit of mankind.	1	2	3	4	5
9.	I use scientific ideas or facts in my everyday life.	1	2	3	4	5

*From *British Columbia Science Assessment Instrument* by Bateson, Anderson, Dale, McConnell, & Rutherford, 1986.

4. Computer Survey

Name:

Do you own a computer?

If yes, what kind?

Do you own a modem?

Have you ever used a modem?

If yes, what for?

How would you rate your ability using a computer? Check one.

beginner _____

intermediate _____

expert _____

What do you sue a computer for? Check all that are applicable.

games _____

word processing _____

graphics _____

bulletin boards _____

spreadsheets _____

databases _____

other (please explain) _____

_____

_____

_____

What would you like to learn to use the computer for?

_____

_____

_____

5. Student Consent Letter

September 5, 1994

Dear Student:

> This year in science you will be conducting research on Asthma. We will be using the computers and SchoolNet to contact other schools across Canada to ask them to help us with our study.

We will be collecting information regarding a real life concern using the latest technology available to us. You will need to develop your own hypotheses, collect your own data and them form a conclusion based on your research about asthma. Many of the questions you ask will not have answers yet. You will be able to collect information that will help the researchers at the Alberta Asthma Centre. This project will last for several months this year to allow us time to collect data from a wide range of schools.

Your final project will be done using a multimedia computer program so that you can present your findings to your classmates, parents and researchers. We will also send copies to everyone that participated. You can put your name on your contribution to the presentation if you wish.

I feel that this study is very valuable and as a result I will be recording our progress so that I can use the information for my thesis "Using Telecommunications to Enhance the Grade 8 Science Curriculum." The objective of my thesis is to learn if involving students in real science research will help students see the relationship between science and their everyday lives.

This year you will need to keep a journal of all the science activities we do throughout the year so that I can refer to them for ways I can improve this project. I will not tell the names of the students that provide me with information. I guarantee that I will keep your thoughts from the journal confidential. I will be using the school name in the study. I would very much appreciate your permission to use any information from your journal so that I can continue to make this type of project better as well as to give tips to other teachers that want to do the same type of project.

If you have any questions please feel free to contact myself at 343-2455 or the supervisor of my study, Dr. R. Gall, University of Lethbridge, 329-2468 or the chair of the Human Subjects Research Committee, Dr. R. Runte. Thank you for your help this year.

Sincerely,

Ms. Lewis

Consent Form

I _____(your name) agree to let my journal to be used to gather information that will help Ms.Lewis, my science teacher, to better understand how this project has contributed to our science program.

Signature: _____

I allow Ms. Lewis to use _____ (your name) contribution to the final multimedia project for presentations to her colleagues, parents and interested community members.

Signature: _____

Name (please print): _____

Address: _____

_____

Date: _____

6. Parent Consent Form

September 5, 1994

Dear Parent/Guardian:

This year the Octapod students will be conducting research on Asthma. As you may be aware from last year, Eastview was selected to be a Pilot School for the SchoolNet project. SchoolNet is government initiative that was designed to enhance educational opportunities for Canadian students. The SchoolNet allows us to link up electronically to other schools across Canada so that we can collaborate and exchange information.

As our contribution to SchoolNet we will be conducting a survey on Asthma. We are hoping to find out if Red Deer has an abnormally high incidence of asthma as well as factors that may be contributing to the rising number of asthmatics. Asthma is a growing concern. It is estimated that asthma costs Canadians $600 million a year. Education is the key. Many of these costs would be eliminated if asthmatics learned to monitor their asthma and avoid triggers and if others learned what to do to help an asthmatic that is having a severe attack. The data we collect will be shared with the Alberta Asthma Centre in Edmonton, as well as Glaxo Canada Incorporated, a major producer of asthma medication.

This project will be very useful to the students because we are collecting information regarding a real life concern using the latest technology available to us. They will be able to use the scientific method to study the issue and develop hypotheses and conclusions. This study will be done throughout the year. We will invite you to our final multimedia presentation in the spring so that you can see what the students have learned and how they used the technology to gather their information. We will be sending copies of this presentation to the Alberta Asthma Centre and all schools that participated in the study.

I feel that this study is very valuable and as a result I will be recording our progress so that I can use the information for my thesis "Using Telecommunications to Enhance the Grade 8 Science Curriculum." The objective of my thesis is to learn if involving students in real science research will help students see the relationship between science and their everyday lives.

I will be requiring the students to keep a journal of all science activities throughout the year so that I can refer to them for ways I can improve this

project. I would very
much appreciate your permission to use any information from your son or daughter's journal that may help other teachers and myself to better understand the project. I
will not disclose the names of any students, however I will be using the school name in the study. I guarantee that all information will be treated confidentially. My findings from the study will be shared with my colleagues.

A final copy of the thesis will be available to you, at your request. If you have any questions please feel free to contact myself at 343-2455 or the supervisor of my study, Dr. R. Gall, University of Lethbridge, 329-2468 or the chair of the Human Subjects Research Committee, Dr. R. Runte.

Sincerely,

Sharon Lewis

Consent Form

As parent or guardian of _____ (student's name) I consent to (his/her) journal to be used to gather information that will help Sharon Lewis, his/her science teacher, to better understand how this project has contributed to their science program.

Signature: _____

I allow Sharon Lewis to use _____
(student's name) contribution to the final multimedia project for presentations to her colleagues, parents, Asthma Researchers and all participants in the project.

Signature: _____

Name (please print): _____

Address: _____

_____

Date: _____

APPENDIX III

School Package for the Asthma Survey

Included in this appendix are:

1. Letter Seeking Participation
2. Cover Letter for Package
3. Parent Letter
4. Classroom Teacher's Responsibilities
5. Return Form
6. Asthma Survey Coordinator Letter
7. Asthma Fact Sheet
8. Canada School Health Survey

1. Letter Seeking Participation

January 24, 1995

Dear Colleague:

I am writing to ask for your help with our SchoolNet project.

The purpose of our project is to learn more about asthma. In Central Alberta we have an unusually high number of asthmatics and that rate is steadily climbing. Canada has the second highest number of asthmatics in the world. Currently, 1.2 million Canadians do have asthma and researchers predict that 1 in 3 people will experience asthma at some time in their lives.

The researchers still have many unanswered questions about asthma and its causes. Our students wish to help the Alberta Lung Association and the Alberta Asthma Centre with their research so that we can help educate Canadians about asthma.

To start our project we need your help. We have sent you a copy of a survey that we would like your students to complete. The survey comes in two parts. The first part is general questions that we need one person to answer for us. It does require a survey of your students to find out how many do have asthma. As well there are some general questions about your weather and area. The second part can be answered by as many students as you would like to survey. They should be done by asthmatics and non-asthmatics. We do require that at least 70% of the surveys be returned so that we will have valid results. Once you have collected the completed surveys return them collect via Greyhound to the enclosed address. The grade 8's will use this data to help form some conclusions about the causes of asthma. We will stay in contact with you to ask follow up questions and so that we can share our findings.

We think it is very exciting to be a part of a study in which the results will be shared with researchers in the field. Young people need to learn more about asthma and how to control it so that they can live healthier lives.

We look forward to working with you and your students. If we can be of any assistance to you, please let us know.

Sincerely yours,

Sharon Lewis

2. Cover Letter for Package

January 6, 1995

Dear :

Thank you very much for expressing an interest in our project. We really appreciate the quick response. Dr. Hessel from the Alberta Asthma Centre is eager to start processing data.

I have enclosed the information that your staff will need to distribute the survey. Once the surveys have been collected, they may be sent collect via Greyhound to Dr. Hessel in Edmonton. He will compile the data and prepare a lesson plan that he will return to the participating schools. We will also be in touch to find out more about your school and the community you live in. Hopefully, we will all be able to communicate back and forth using SchoolNet. Once SchoolNet is in operation we will be asking schools in other provinces to participate so that we can examine the problem nationally.

If you have any questions, please contact me.

Thank you once again for your support.

Sincerely yours,

Sharon Lewis

3. Parent Letter

October 3, 1994

Dear Parents/Guardians:

Three classes of Grade 8 Eastview Students are starting on a very exciting, innovative project using telecommunications. We have taken on the challenge to find out more about **asthma.** Eastview students will be linked to over 1000 schools across Canada as well as a multitude of other resources through a computer network called SchoolNet. We will be able to communicate with students in all Provinces and Territories using the modem that we have set up in the library.

This topic was selected because there is an increasing number of people of all ages being diagnosed with asthma. We want to know why. Central Alberta seems to have a surprisingly high number of asthmatics living in the area compared to the rest of Alberta and Alberta has a higher percentage than the rest of Canada. To start to find the answers we are conducting a survey. We plan to survey students from Eastview, Red Deer, Alberta and Canada. We will use the SchoolNet to reach as many students as we can. This will help us gather enough data to draw some conclusions about this serious threat to our health. Once we have analysed the data and have found the areas that have high and low numbers of asthmatics we will start to look in more detail at the areas. We will contact the schools again and find out about their industry, school facility, weather patterns and any other links that we find significant. After doing this, we will consult with experts in the field. Together, we will see if we have discovered anything new.

We are very fortunate to have the Alberta Lung Association and the Alberta Asthma Centre helping us with our research.

The survey that your son or daughter has brought home needs to be completed and returned to the school no later than **October 11, 1994.** The responses will be kept confidential and we will keep you informed of our progress. When we have completed our research, we will have an evening presentation to show you what we have learned.

Thank you for your co-operation in our project. If you have any questions or would like to see the SchoolNet in action, please do not hesitate to contact me.

Sincerely yours,

Sharon Lewis
Grade 8 Science Teacher

4. Classroom Teacher's Responsibility
Canada Wide Asthma Survey

Classroom Teacher's Responsibilities:

1. Please inform your students of the purpose of the survey. I have included an Asthma Fact Sheet in the package if you require more information.

The following survey is being conducted by the Eastview Community School Students in Red Deer, Alberta, the Alberta Lung Association and the Asthma Research Council. We are hoping to learn more about asthma. We want to know why more and more people are being diagnosed with asthma. Alberta has the highest number of asthmatics in Canada. We are very concerned about this and want to know if it is a result of our industry and farming or if it is coincidental. We need your help in completing the survey so that we can answer some of these questions and inform the public. This is a serious health concern. People are dying from asthma just because they are not properly informed. We need to start doing something about it now.

This survey is the biggest one that has ever been done on this topic. With your help we will be able help the medical profession develop a greater understanding of asthma. to do something about asthma.

Please take the time to take the survey home and have it completed. Your answers will be kept confidential and we will get back to you with our findings.

Thank you for helping out.

Eastview Community School Students

5. Return Form

Please return this information with the surveys.

Survey Coordinator's name:

Name of School:

Address of School:

Number of students in the school: _____

Grade(s) surveyed: _____

Number of students surveyed: _____

Number of surveys returned: _____

Other comments:

RETURN TO:

Alberta Asthma Centre
Attn: Dennis Michaelchuk
11402 University Avenue
Aberhart Centre, 3rd Floor
P. O. Box 4033
Edmonton, Alberta
T6E 6K2
Phone: 492-4159
Fax: 492-0362

6. Asthma Survey Coordinator Letter

Asthma Survey Coordinator

List of responsibilities:

Choose a grade(s) to survey. You may do all of the grades if you choose.

Duplicate the survey and cover letter for each student.

Duplicate the classroom teacher instructions for each teacher involved.

Distribute the surveys and the cover letter to each classroom teacher with a set of instructions.

Instruct the students to take home the survey so that their parent or guardian can complete it. The survey must be returned by _____ .

Collect all materials from the teacher.

Ensure that we receive at least 70% of the surveys so that the survey is valid.

Ship the completed surveys via Greyhound bus collect to:

Alberta Asthma Centre
Attn: Dennis Michaelchuk
11402 University Avenue
Aberhart Centre, 3rd Floor
P. O. Box 4033
Edmonton, Alberta
T6E 6K2
Phone: 492-4159
Fax: 492-0362

7. Asthma Fact Sheet

1.2 Million Canadians have asthma.

Asthma kills an estimated 600 Canadians a year. These deaths are preventable.

Asthma is the only treatable, lifelong condition in the Western World with a rising death rate.

There are many triggers to asthma ranging from cold air, exercise, food additives, environmental factors and drugs such as Aspirin.

Asthma is no longer considered to be a psychological problem.

20% of children have asthma.

Children do not outgrow asthma. They must learn to identify and avoid the trigger or factors that make the asthma worse.

8. Canada School Health Survey

CANADA SCHOOL HEALTH SURVEY

Student's date of birth _____ _____ _____
day month year

Student's grade _____

Student's school_____ Town/ City _____/_____
Province

Student is a (circle one) : Boy.....1
Girl.....2

PLEASE NOTE: the following questions apply ONLY to the child whose birthday is listed above. Please circle the number of the most appropriate response.

1. Compared with two years ago,would you say the health of your child now better, worse, or about the same ?
Better 1
Worse.....2
Same.....3

2. Over the PAST YEAR has the health of your child caused him/ her a great deal of worry, some worry, hardly any worry, no worry at all?
A great deal of worry....1
Some worry.....2
Hardly any worry.....3
No worry at all.....4

3. Compared to other people the same age as your child , would you say
his/ her health is. Excellent.....1
Good 2
Fair 3
Poor.....4

4. Is your child limited in the KIND of play he/ she can do because of his/ her health? Yes.....1
No.....2

5. Is your child limited in the amount of play because of his/ her health?

Yes.....1
No.....2

6. Is your child limited in school attendance because of his/ her health?

Yes.....1
No.....2

7. How many days of school did your child miss because of illness during the last month ?

_____Days

8. What illness did your child have the last time he/ she missed school?

_____

9. Is your child limited in the KIND or AMOUNT of <u>other</u> activities because of his/ her health?

Yes 1
No.....2

10. What condition (s) limit any of your child's activities?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

11. Approximately how many times has your child had a COLD in the past year?

None.....1
1-2 colds.....2
3-5 colds.....3
More than 5.....4

12. a) Has your child ever had PNEUMONIA?

Yes.....1 If yes, go to 12B No.....2 If yes, go to 13A

b) How old was your child?
_____years, _____months If more than one time list the first.

13. a) Has your child ever had ASTHMA?
Yes.....1 If yes, go to 13B, C, D
No.....2

b) At what age did the asthma start?
Yes.....1
No.....2

c) Was the asthma confirmed by a doctor?
Yes.....1
No.....2

d) Does your child still have asthma?
Yes.....1
No.....2

14. Does your child ever WHEEZE when he/ she does not have a cold?
Yes.....1
No.....2

15. Does your child ever have ATTACKS of WHEEZING?
Yes.....1
No.....2

16. a) Did your child ever attend day care? (not a baby sitter)
Yes.....1 If yes go to 16B, C
No.....2 If No go to 17

b) How long did your child attend day care?

_____years _____months

c) How old was your child when he/ she started day care?

_____years _____months

INFORMATION ABOUT FAMILY: These next few questions pertain to the family. The answers will give us an overall view of those who took part in the survey. This information as well as the previous survey information will be kept completely confidential. You may skip questions if you do not want to answer them.

17. a) In this household does the mother/ female guardian smoke?

Yes.....1
No.....2

b) In this household does the father/ male guardian smoke?

Yes.....1
No.....2

c) In this house hold is there anyone else who smokes?

Yes.....1
No.....2

18. For each of the parents/ guardians, record their HIGHEST LEVEL of EDUCATION

	Mother/ Female GUARDIAN	Father/ Male GUARDIAN
Grades 1-6	1	1
Grades 7-11	2	2
Grade 12 graduate	3	3
ATTENDED technical school college or university	4	4
GRADUATED with a diploma or degree from technical school college or university	5	5

19. a) Relationship of person completing survey to child?

Mother.....1
Father.....2
Female guardian.....3
Male guardian.....4

b) Date the survey was completed ____ day _____ month _____ year

THANK YOU VERY MUCH FOR YOUR PARTICIPATION!

APPENDIX IV

Samples of Class Organizational Materials

Included in this Appendix are:

1. Student Groups and Topics
2. Asthma Letter Instructions

1. Asthma Groups and Topics 1994-95

Disc #	Topic	Group Members
8/4/1	Medication	Ray, James, Jeff, Chris
8/4/2	Heredity	Jennifer, Courtney, Robin, Robyn, Alisha
8/4-3	City vs. Town	Grant, Randie, Todd, Daryl, Levi
8/4/4	Pets	Jesse, Adrian, Crystal, Kandice
8/4/5	Sports	Kelly, Nevin, Graham, Brent
8/4/6	Races	Lenke, Carmen, Lucy, Sarah, Telissa
8/4/7	Young vs. Old	Christi, Allison, Tasheena, Stacy, Leah
8/3/1	Travelling	Marni, Meranda, Crystal, Shaunna
8/3/2	Emotions	Megan, Amie, Cara Lea, Sheryl
8/3/3	Athletes	Ray, Derek, Mark, Sean, Joel
8/3/4	Environment	Faye, Graeme
8/3/5	Hereditary	Andrew, Peter, Jim, Tim
8/3/6	Sports/Exercise	Bona, Melanie, Erica, Carnelle
8/3/7	Seasonal	James, Paul, Nick, David
8/2/1	Age	Karla, Rene, Carmen, Kealy,
8/2/2	Toiletries	Michelle, Heather, Amber, Karla, Natashia
8/2/3	Hereditary	Bob, Ryan, Ryan, Jim
8/2/4	Diet	Conrad, Frank, Josh, Chad
8/2/5	Smoking	Derek, Derek, Trevor, Chris
8/2/6	Weight	Courtnay, Jenny, Andi Beth, Janelle, Chris
8/2/7	Sports	Colin, Sherry, Graham, Jennifer

2. Asthma Letter Instructions

This letter must contain the following information

Dear students:

An introduction to who you are e. g.

grade 8 students

Red Deer, Alberta

working on a Canada Wide asthma study

purpose of the study

your own topic

information about you e. g. hobbies...

What we want from them

a) to do a schoolwide survey to determine the percentage of students with asthma
b) some individual surveys to find out more detailed information about the area in which they live (industry, weather...) and factors that affect asthma where they are so that we can compare it with ours

To write back to let us know if they are willing to help us out on either part "a" or "b"

- proof read by all group members
- spell checked
- normal black font in size 12

Survey Questions: We will combine all questions to make one large survey that will be sent to all schools. It will be your responsibility to write back and forth to 3 schools on behalf of the whole class. The questions must be very specific that an individual student can answer without doing research. For example, do not ask is asthma hereditary but instead ask several questions so that you can determine the answer.

For instance,

1. Do you have asthma?
2. Does your mother have asthma?
3. Does your father have asthma?
4. a) Do you have brothers or sisters?
   b) Do they have asthma?
5. Does anyone else in your family have asthma?

Then you could ask more detailed questions to find out how similar their asthma is.

APPENDIX V

Creating a Virtual Tour with Students

Creating a Virtual Tour with Students

The purpose of this project was:

- to teach students about the potential of technology through a very worthwhile and motivational project.
- to provide an opportunity for students to use a vast array of technology to create a project that will be viewed by people all over the world.
- to learn more about the history of Red Deer, about museums and career opportunities in this field.
- to create an awareness of the importance of community support in maintaining museums.

An unintentional but positive outcome was the publicity that this project generated for the museum and the school.

To complete the tour we used two digitizing cameras, Quick Take 100's by Apple, and a video camera, LC 475 computers with 8 MB of RAM, an InterNet connection, ClarisWorks, Sound Machine, Netscape, Graphic Converter, JPEG, and PrintShop Deluxe for parent invitations to view our project.

To get started I showed the students other tours that have already available on the InterNet. We viewed the Ontario Science Centre tour that is available at http://www.osc.on.ca. We then discussed what the students liked and didn't like about the museum tour. The students brainstormed a list of Central Alberta places that we could easily visit more than once. We decided on the Red Deer and District Museum. I contacted Rod Trentham the Museum Director to discuss our plans. Fortunately, he is very active in trying to bring the Red Deer Freenet. He was very excited about our project because he felt that this may help motivate the committee to get things moving so that more of these projects could be undertaken.

The next step, the exploratory trip, was somewhat frustrating for the students

because many of them wanted to do it all at once. I thought it was better to get some ideas and take a few pictures so that the quality of the lighting could be checked. It was very important for the students to choose the area that they wanted to research so that the project remained interesting to them. Two students took care of finding out the general museum information and one student did the credits. This way a student could be in charge of making sure that everyone had a different topic and could let others know what had been covered. This freed myself up to help with the technical problems and to train individuals for different aspects of the project.

Back in the classroom, we discussed format and html commands. It was important that all students had some guidelines in mind so that the completed project looked unified. A very challenging part of this project was to convince the students that they could understand HTML well enough to be use it. I printed a short excerpt of the School Homepage in text version so that they could compare the written information to what actually appears on the screen. They quickly realized that many of the commands are simple English. For example, "center" does just that. They also saw that there was a start command and a stop command that was the same except a "/" appeared before it. They used this copy to guide them with their own. For some, I had to underline the parts that they should replace with their own title, information, graphic name and sound name. Once they got started they found it was possible and began to get more creative. All they needed to do was to type in two to three lines and then open it in Netscape or Mosaic, browser programs, to see that they had been successful. Many of them did this repeatedly. They did have to check and recheck spelling and spacing until it was perfect.

On the second trip to the museum, each student needed to have their exhibit planned so that they could prepare a list of information and pictures that they still needed. For this trip, the students were far more focussed so that they could quickly gather the information they required.

Any word processing program could be used to prepare the html document.

Once the students had it written, proof read and spell checked, they saved it as text. I told them to use an informative name followed by ".html". They wrote out their scripts and practised what they wanted their sound clips to say so that we would not have to retape it many times until they got it right.

I trained one individual how to use Sound Machine so that he could then teach the next person. It worked as a chain reaction so that by the end of the project all of the students knew how to record and save their messages.

Students took turns downloading the QuickTake, images into the computer and converting them to GIFs, a common graphic format that can be read by Netscape, using the Graphic Converter program that I downloaded from Web 66 (http://web66.coled.umn.edu/Cookbook/contents.html, see Appendix VI). The students named the pictures and then we printed out a list of the names that they used so that their classmates would be able to use the correct name in their html document.

Each student was assigned a location number that had to be written into their text (see sample) so that we could link it to the list of exhibits. This was important so that I did not have to go through later and type them in. I did the links from the main exhibit list to each exhibit. I did encounter memory problems when I tried to put too many exhibits into one document. I ended up dividing the project into five pieces that were linked together. This was important so that all graphics would load in a reasonable amount of time.

It was very important to have each student sit down with me so that they could make sure that their section is the way they intended. Linking all of the projects was time consuming, mostly because it was new to me and I had to decide what the best way was.

Once the project was completed I invited Rod Trentham, the Museum Director, to the school to see the end product. This was a very important step because some of the information in the brochure we used was outdated. He could also pick up on omissions and misinterpretations that are inevitable

with this type of project.

The final step was very rewarding. The students invited their parents to come to the Virtual Tour. We had to do this in two nights because no one wanted to be left out. The response was overwhelming. Many of the parents came both nights. The students had a great time taking turns at the computer and telling their parents about the museum. To make it easier for the parents to see, we hooked the computer up to the VCR so that there would be a larger screen. Parents were very enthusiastic and supportive of the project.

Instructions for students

- Choose an exhibit that you wish to research.
- Take 2-3 pictures of the exhibit.
- Record notes on the exhibit.
- Plan your section and decide if more information is needed. Check your pictures to make sure they are suitable.
- Make a list of what you need to gather on your return visit.
- Gather the rest of your information and pictures.
- Ask if there is more information in the archives and research this if possible.
- Follow the html format provided and type your information into a word processing document.
- Check the list of graphics and add the appropriate one to your document.
- Spell check and edit. Make sure that spaces are where they are supposed to be and that each command has a start and an end.
eg. <h1>....</h1>
- Save the document as TEXT with a descriptive name followed by ".html".
- Write out what you want to record for your presentation.
- Record your message and save it under the name you used in your document.
- Open up your document in the browser program (eg. Netscape or Mosaic)

- Check it over very carefully for grammar, style and spelling errors.
- Ask a classmate to check it over and make suggestions.
- Meet with the teacher once the class documents are compiled.
- Invite your family to the open house to view your presentation.

HTML commands we used

 centers text and graphics
<hr> draws a line across the screen
<b> bold
<p> starts a new paragraph one line down

 new line without a space
 separates items in a list
 used for ordered lists (numbers lines)
 used for unordered lists (each item starts with a bullet)
<dd> indents
<h1> headline one (largest), <h2>, <h3>...descending sizes of headlines
blue words This command creates a hyperlink to another document on the same computer in the same directory or to a different location. The sample HTML document shows examples of both.
<img src="prisoner.gif"> Used for showing inlined images. This will display the graphic called prisoner, an image within the document itself. GIFs are becoming the standard.
Blue words to signal audio

The next two commands are used to link one section of the page to a section later on. The Canadian Prisoner of War Uniform would appear in blue. When it is clicked it will automatically move to the information on the uniform. This is used within the same document.
Canadian Prisoner of War Uniform
Prisoner of War Uniform

This next command would be used if the link is within another html

document. The underlined section is the name of the second document.
Van Slyke Plow

Sample of a student prepared HTML document

<h1>Red Deer and District Museum Exhibits</h1> <a
name="location-1"Choose the exhibit you wish to visit.
Van Slyke Plow
Farming
Inuit Art
Canadian Prisoner of War Uniform

Return to the Introduction
<H1> Inuit
Art </H1><hr> <img
src="inuit.gif"> <p>A bit of history.The
artist is Howick Asian. It is a sculpture of a women throwing stones. It
was made in Cape Dorset of medium green soapstone. Its dimensions are
35.5
cm and it is worth 1 500 dollars.
<H1> Prisoner of War
Uniform </H1> <hr> <img
src="prisoner.gif"> <p>This is a photo
of a rare Canadian Prisoner of War uniform that is still in good wearing
condition. It was worn by prisoners in Medicine Hat. It was made by G.W.G.
The large red patches are targets so that the prisoners could be spotted
easily. It was bought in Regina, Saskatchewan after 1947 in an Army Navy
store and then gifted to the Red Deer and District Museum, circa 1950. This
cap cost $1.97 per dozen. Smocks, in all sizes were $2 each or less for a
dozen and trousers were various prices. This pair was not worn much and
they still had the 1947 patch on the left leg band.
<a
href="#location-1">Return to main list

Our Virtual Museum tour was put online free of charge by CCINet in Edmonton, Alberta, Canada. The address or the universal resource locator, URL, is http://www.ccinet.ab.ca/eastview/eastview.html

RED DEER & DISTRICT MUSEUM

Welcome.

ACTIVITIES: Bringing the past to life.

Join an interpreter for a walk through old downtown, you can see the booms and busts of old town Red Deer. You can even see an old school with the bell and the whole bit. Just next door is Heritage Square complete with old buildings. You can celebrate the seasons with special events even an old time Christmas to the harvest festival YEE-HAW.

Attractions

Attractions: The best in the west.

Above is a picture of the electrical model train that is at the museum. There are many other neat attractions at the Red Deer museum like actual Indian arrowheads. They also have barbed wire and button collections. They have an art gallery featuring local professional

and amateur painting and sculptures.

This sculpture was done by Laurel Lardner. It is part of the Red Deer College Art Show.

Access

On the edge of downtown, the museum can be reached easily by car, public transit, etc. It is right next to the recreation centre and the Golden Circle. All are stroller and wheelchair accessible (both available upon request). The museum and archives are open 8:30 am - 5:00 pm on weekdays.

Archives

On an average day in the archives you might see students doing research or visitors researching an ancestor or old friend. Or it might be a volunteer sorting papers and photos.

Gift shop

An excellent selection of books on Western Canada compliment the many souvenirs and local crafts. The store is run by volunteers. There will always be smiles and free hot coffee.

Hours

Winter hours
Galleries and exhibits open 12:00 pm - 5:00 pm daily except Christmas and New Year.
Monday through Thursday 7:00 pm - 9:00 pm

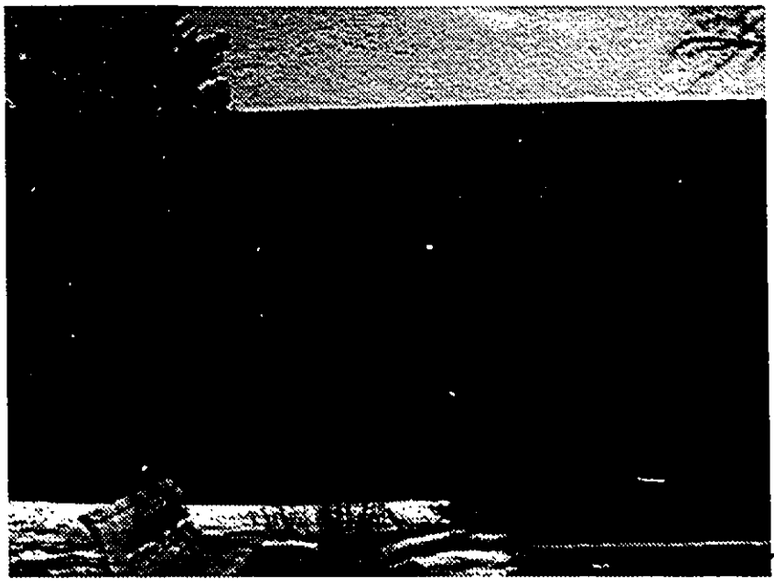
Summer hours
Weekdays 10:00 am - 9:00 pm
Weekends 1:00 pm -5:00 pm

From here you may go to the Exhibits.

Special Thanks

Special thanks to the staff of the Red Deer and District Museum for helping us find our information and being great tour guides. Especially Rod Trentham and Valerie Miller.

Museum Facts

 The Red Deer and District Museum was built in 1977 and was opened in 1978. This is the second museum. The first one was housed in the basement of the Recreation Center in Red Deer. In 1984, the museum was expanded. The galleries and collection were the main target of the expansion. The people of Red Deer and District all chipped in to help.

Credits

The grade seven science gateways class from Eastview Community School put this tour together. We went to the Red Deer Museum to get notes and pictures for the virtual tour.

Credits

- Brian Bobyk-Farming
- JoAnn Collins-Eating
- Kara Cronin-Bell
- Kendra Henwood-General Store
- Brian Hollingshead-Inuit Sculpture,Feather Hat, Prisoner of War Suit
- Kara House-1700 Bedroom

- Angela Kidd-Introduction
- Tyson Kidd-Homesteaders
- Chris Lundgren and Luke Mather-Farming Tools, Plow Derek Olsen-General Museum Information
- Stephanie Prysunka-Early Business
- Scott Raabis-Estonians, Bottle Openers, Museum Facts and Special Thanks
- Jackie Scott-Red River Cart
- Karena Taskila-Eastview Credits
- Sandi Waters-Archeology

From here you may go to the Exhibits

APFENDIX VI

Eastview Community School Homepage

Eastview Community School Homepage

Available online at http://www.ccinet.ab.ca/eastview/eastview.html

<HTML><HEAD> <TITLE>E</TITLE> <TITLE>EA</TITLE>
<TITLE>EAS</TITLE> <TITLE>EAST </TITLE> <TITLE>EASTV</TITLE>
<TITLE>EASTVI</TITLE> <TITLE>EASTVIE</TITLE>
<TITLE>EASTVIEW</TITLE> <TITLE>EASTVIEW COMMUNITY</TITLE>
<TITLE>EASTVIEW COMMUNITY SCHOOL</TITLE> </HEAD>
<h1> Eastview Community School </h1> <hr
SIZE=6> Find out more About Our
School
<img src="eastview.jpeg"> <p>3929
40 Avenue
 Red Deer, Alberta, Canada
 T4N 2W5
<body>
 <font size=+1.5> Visit our Homepage on the WWW at <a
HREF="http://www.ccinet.ab.ca/eastview/eastview.html">CCINet in
Edmonton or <a
HREF="http://199.213.70.6/schnet/reddeer/east.htm">Alberta
Education. <img align=left src="pencil.gif"><h2>Here are some of our
favourite URLs:</h2> <h3>For
Students</h3> <dd>
<a
HREF="http://SchoolNet.carleton.ca">SchoolNet <a
HREF="http://www.cs.cmu.edu:8001/Web/Unofficial/Canadiana/README.
html">Canadiana Reference Page <a
HREF="http://www.osc.on.ca/">Ontario Science Centre
<a
HREF="http://freenet.calgary.ab.ca/science/tyrrell">Tyrrell
Museum<dl>The tour of Tyrrell Museum is an excellent resource for
grade 8 science, unit 4: The Earth's Crust.</dl>
<a
HREF="http://www.isisnet.com/scs">Sackville Centennial School:
Nova Scotia<dl>Check the spots they recommend on the WWW.</dl>
<a HREF="http://www.screen.com/streetcents.html">Streetcents
<a HREF="http://www.cochran.com/theosite/KSites.html">Theodore
Tugboat's Children Sites<dl>This site must be visited. Check out the
Froggy Page for the Virtual Frog Dissection.</dl> <a
HREF="http://www.seanet.com/Vendors/billnye/nyelabs.html">Bill Nye

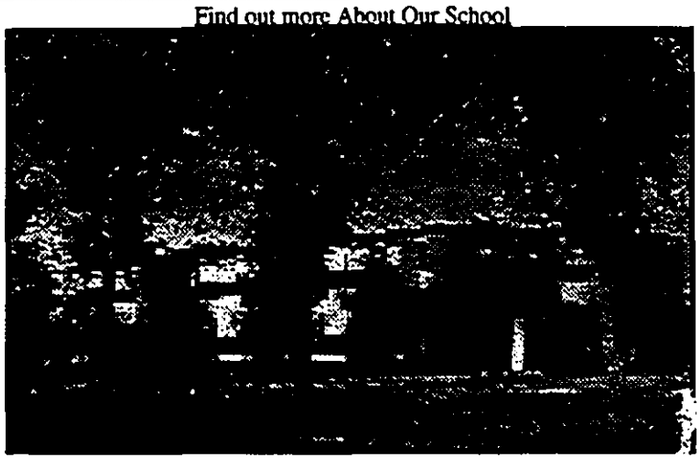
TSG <a HREF=" <a
HREF="http://gagme.wwa.com/~boba/kids.html">A Ton of Links to
Valuable Resources: <dl> This will connect you to Uncle Bob's
homepage. Click anywhere on the first page to take you to a list of his sites.
At this time he has divided it into 7 sections. Each one is worth checking out.
Section 5 has a link to Classroom Connect.</dl>
<a
HREF="http://www.kiae.su/www/wtr/kremlin/index.html">Tour
Russia <a HREF="http://gag.observ-
gr.fr/internet/References.html">CIA World Fact Book, <dl>dictionaries,
thesaurus, historical information...</dl>
<a
HREF="http://informns.k12.mn.us/mayaquest">Maya Quest <a
HREF="gopher://kids.ccit.duq.edu">KIDLINK
<a
HREF="http://www.oise.on.ca/pfl/PFL.html">Paddle For Life
<a
HREF="http://www.citybeach.wa.edu.au/">Australia: City Beach
School
<a HREF="http://quest.arc.nasa.gov">NASA K-12 Internet
Initiative<dl>This site is linked to the NASA stations across the US.
You can find out about the past and future space shuttle missions</dl>
<a HREF="http://www.OnRamp.ca/~lowens/107kids.htm">Canada's
Kids' Page <a HREF="http://www.city.net/">City
Net</dl></dd> <h3>For Teachers</h3><dd>
<a
HREF="http://www.edc.gov.ab.ca">Alberta Education <a
HREF="gopher://ericir.syr.edu:70/11/Lesson">Lesson Plans Galore
<a HREF="http://web66.coled.umn.edu/Cookbook/contents.html">Web
66 <a
HREF="http://www.pathfinder.com/@@@z9eraaaaaaaqcxb/time/">Daily
Time Magazine Updates <a
HREF="gopher://schoolnet.carleton.ca:419/11/Frequently.Used/jughead.dir"
>JUGHEAD<dl>This is another search mechanism. This link will allow
you to search SchoolNet or the WWW.</dl> <a
HREF="http://cygnus.tamu.edu/Texlab/table.html#Non-chemical">Plant
Disease<dl>This location is a useful resource for grade 8 science and the
Managing Plant Growth Unit.</dl> <a
HREF="http://www.web.apc.org/wcwild/biodiver.html">Protect Canada's
Biodiversity <a

HREF="http://www.yahoo.com/Education/">Yahoo Educational Resources <a HREF="http://english-www.hss.cmu.edu/poetry.html">Poetry <a HREF="http://www.cs.uidaho.edu/~connie/interests.html">HTML Information<dl>This location has a wide range of subject area information.</dl> <a HREF="http://edweb.cnidr.org">ED WEB <a HREF="http://www.visions.com/">Canada Net Pages <p>From here you can also go to the Animal Sites homepage to find resources on all kinds of animals. <p>You are welcome to go on a Virtual Tour of the Red Deer &amp District Museum produced by the Gateways Grade 7 Science class. <p>Find out more about the <a HREF="asthma.html#location-2">Asthma Study that the grade 8 students are conducting. If you are interested in participating, please read the project description on SchoolNet<p>This will take you to the <a HREF="eastview.html#location-6">French resources that Ms. S. Kennedy's grade 8 classes used.<hr SIZE=6> <p>The students and staff of Eastview Community School in Red Deer, Alberta would like to express their appreciation to <blink>CCI Net</blink> in Edmonton, Alberta, Canada for providing us this space so that we can share our projects and what we have found on the Net.<p> <h2>Animal Sites</h2> <hr> <img src="eagle.gif"> <p> The Eastview Sports Teams are the Eagles. <h4>ANIMAL URLs:</h4> The <a HREF="http://netvet.wustl.edu/">ELECTRONIC ZOO has information on just about any animal you can think of and more. If you have always wanted to visit <a HREF="http://www.bev.net/education/SeaWorld/">Sea World and Busch Gardens now is your chance.<p>From here you can also go to the Favourite URLs to find all kinds of other interesting information. Be sure to try Theodore Tugboat. <HR> <h2>French Resources</h2> <dd>
<a

HREF="http://schoolnet.carleton.ca">SchoolNet <a
HREF="http://sunsite.unc.edu/louvre/">Louvre in Paris <a
HREF="http://sunsite.unc.edu/louvre/paris/">Tour of Paris <a
HREF="http://sunsite.unc.edu/louvre/paris/cata/">Tour of the
Catacombs <a HREF="http://www.city.net/">City Net
<a
HREF="gopher://gopher.stat-usa.gov/11/STAT-USA/NTDB/Wofact">CIA
World Fact Book 1994 <a
HREF="http://www.willamette.edu/~tjones/Language-Page.html">French
Language Resources (dictionaries...)
<h4>A Note to
Teachers</h4>For Internet projects at Eastview, we have found that there is
an advantage to having a couple of students find the information sources and
put them together in a Homepage. Other students can quickly access this
information and download what they need so that more students can use the
one computer that is online. <p>From here you can return to the <a
href="eastview.html#location-4"> Favourite URLs. <p>Last updated
September 7, 1995. <hr>
<p><img
src="mail.gif" hspace=6>If you have questions or comments, please
contact slewis@ccinet.ab.ca. <font
size=+1.5>

Eastview Community School

Find out more About Our School



3929 40 Avenue
Red Deer, Alberta, Canada
T4N 2W5

Visit our Homepage on the WWW at CCINet in Edmonton or Alberta Education.

Here are some of our *favourite* URLs:

For Students

1. SchoolNet
2. Canadiana Reference Page
3. Ontario Science Centre
4. Tyrell Museum
   The tour of Tyrell Museum is an excellent resource for grade 8 science, unit 4: The Earth's Crust.
5. Sackville Centennial School: Nova Scotia
   Check the spots they recommend on the WWW.
6. Streetcents
7. Theodore Tugboat's Children Sites
   This site must be visited. Check out the Froggy Page for the Virtual Frog Dissection.
8. Bill Nye TSG
9. A Ton of Links to Valuable Resources:
   This will connect you to Uncle Bob's homepage. Click anywhere on the first page to take you to a list of his sites. At this time he has divided it into 7 sections. Each one is worth checking out. Section 5 has a link to Classroom Connect.
10. Tour Russia
11. CIA World Fact Book,
    dictionaries, thesaurus, historical information...
12. Maya Quest
13. KIDLINK
14. Paddle For Life
15. Australia: City Beach School
16. NASA K-12 Internet Initiative
    This site is linked to the NASA stations across the US. You can find out about the past and future space shuttle missions
17. Canada's Kids' Page
18. City Net

For Teachers

1. Alberta Education
2. Lesson Plans Galore
3. Web 66
4. Daily Time Magazine Updates
5. JUGHEAD
   This is another search mechanism. This link will allow you to search SchoolNet or the WWW.
6. Plant Disease
   This location is a useful resource for grade 8 science and the Managing Plant Growth Unit.
7. Protect Canada's Biodiversity
8. Yahoo Educational Resources
9. Poetry
10. HTML Information
    This location has a wide range of subject area information.
11. ED WEB
12. Canada Net Pages

From here you can also go to the Animal Sites homepage to find resources on all kinds of animals.

You are welcome to go on a Virtual Tour of the Red Deer & District Museum produced by the Gateways Grade 7 Science class.

Find out more about the Asthma Study that the grade 8 students are conducting. If you are interested in participating, please read the project description on SchoolNet

This will take you to the French resources that Ms. S. Kennedy's grade 8 classes used.

The students and staff of Eastview Community School in Red Deer, Alberta would like to express their appreciation to CCI Net in Edmonton, Alberta, Canada for providing us this space so that we can share our projects and what we have found on the Net.

Animal Sites

The Eastview Sports Teams are the Eagles.

ANIMAL URLs:

The ELECTRONIC ZOO has information on just about any animal you can think of and more. If you have always wanted to visit Sea World and Busch Gardens now is your chance.

From here you can also go to the Favourite URLs to find all kinds of other interesting information. Be sure to try Theodore Tugboat.

French Resources

1. SchoolNet
2. Louvre in Paris

3. Tour of Paris
4. Tour of the Catacombs
5. City Net
6. CIA World Fact Book 1994
7. French Language Resources (dictionaries...)

A Note to Teachers

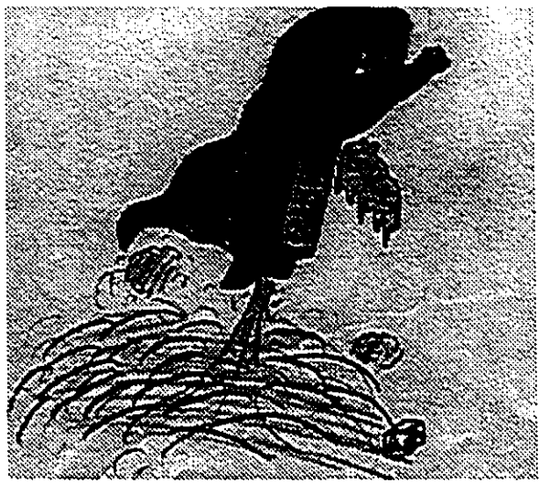
For Internet projects at Eastview, we have found that there is an advantage to having a couple of students find the information sources and put them together in a Homepage. Other students can quickly access this information and download what they need so that more students can use the one computer that is online.

From here you can return to the Favourite URLs.

Last updated September 7, 1995.

If you have questions or comments, please contact slewis@ccinet.ab.ca.

Asthma Project



The grade 8 students at Eastview Community School are spearheading a World-Wide study of asthma. We chose to do this study for a number of reasons.

- The Alberta Education Science Curriculum focuses on the integration of Science, Technology and Society. The SchoolNet Project provided us with an ideal opportunity to provide our students with a highly relevant project that would allow our students to perform an original scientific study.
- We are very curious as to why so many people are now being diagnosed as having asthma. The incidence of asthma is increasing at an alarming rate.
- We want to know why Canadians seem to be more apt to have asthma when compared to many other countries.
- Asthma is costing Canadians more and more each year. Educating people about this illness would reduce these costs. If you are interested in participating in our study, visit the project description at SchoolNet

In December, 1993 we were notified of our acceptance as a pilot school for the SchoolNet project. This meant that we would be provided free access to all SchoolNet resources and Internet.

We began our study in February 1993, once the system was in place. Our students developed a research question that they could answer by surveying students across Canada via SchoolNet.

We were very fortunate to have the support of the Alberta Asthma Centre in Edmonton, Alberta. They provided us with the survey that they had already used in Edmonton area elementary schools. This was our starting point. We remained in touch with Dr. Hessel and his associates throughout the project. They provided us with a lot of encouragement and support. Colleen McPhee from the Alberta Lung Association in Red Deer was very helpful and supportive. She came in to speak to the students and helped us throughout the project.

At the end of June we still had many unanswered questions. We decided that we would like to continue in the following school year. This year we are expanding our study to include other countries.

Internet Connections

- Asthma Tutorial

An interactive tutorial for parents and children.

- Are you breathing free?

Here you can get all the latest stories, stats, and information about asthma.

- Yahoo Asthma Resources

Artwork by Paul Lindgren and InterNet Connections by Ray Nightingale, grade 8.

If you would like to participate in our survey, or have any suggestions, please contact us at the address above or send a response via email to

slewis@ccinet.ab.ca.

Return to Eastview Community School Homepage.

APPENDIX VII

Teacher Inservice Materials

Included in this appendix are:

1. Teacher Inservice Package
2. Science Resources Homepage (also on computer disc)
3. Video Tape Inservice for Accessing the Internet
4. Acceptable Use Policy

1. Teacher Inservice Package

Getting Started on SchoolNet

1. Logging on.

Command	Type	Reason
Command F	PPP	This will find the modem connection to SchoolNet. It will find three items. You want the first one. Config PPP.
Command O		Opens "Config PPP"
	click on open	Dials the modem to connect you. You may or may not hear your modem dialling. A screen does appear to tell you what is happening.
Command W		To close the window after the connection is open. You may choose to leave this open so that you will remember to HARD CLOSE when you are finished.
double click on hard drive icon		to open the hard drive
double click on SchoolNet Applications folder		allows you to choose the method of accessing the resources

Application	Purpose	Logging In
Netscape or Mosaic	WWW Browser Program. This replaces many of the other programs. You can access gopher, ftp, newsgroups...	Open the Netscape or Mosaic folder and click on the program application. If it is the first time you have used it, it may have a n extension ".sea" (self-extracting archive). Double click and it will de-compact it and make a new icon. Use this one.
Fetch	Enables you to go to various sites to download files and programs that you want to read or use off line.	Open the Fetch folder and click on the Fetch icon. In the file menu select open connection. From her you type in the address that you have found or go to one of the "shortcuts."
Telenet	This program allows you to log into another computer and read the files.	Open the telenet folder and click on the telenet icon. Choose open connection from the file menu. Type in the address either in words or the numbers in the host
Newswatcher	This area contains 100s of newsgroups on just about every topic imaginable.	Open the newswatcher folder. Click on the NewsWatcher icon. Under the windows menu select show full group list. The newsgroups specific to SchoolNet are under can.SchoolNet... The first time you post messages you will need to put in your mail program.

2. Logging off

   For all applications choose quit from the file menu to end your session. If you do not want to end your session entirely but would like to go somewhere else you may choose close connection from the file menu.

3. Helper Applications

   This folder contains applications that enable us to view graphics, play sounds and view videos.

Using Netscape

The blue and purple text are links to other documents (locations). Clicking on any of these will take you somewhere else. They are called HTML. It works the same as Compton's on CD. Anytime you want to return to where you just were hit the backwards arrow key in the menu bar or use the GO MENU on the top bar.

If you find an interesting site, add it to your bookmark list. Next time you will be able to pull down your bookmarks and go directly there.
In the top right corner of the Netscape screen there is a "N". Whenever this is moving/pulsing it is trying to connect you to your selection. If it is taking a long time or you change your mind, clicking on the stop icon will cancel your request. It sometimes takes a minute or two to return the control to you so that you can make another selection. The URL (universal resource locator) will show you the address of where you are going. You may copy it down to use in the future so that you can type it in yourself instead of going through the menu system (using the bookmark is easier).

2. Science Resources Homepage

```
<html><body background="bluebg.gif">
<center><h1>Welcome to a Tour of the Internet</h1><img
src="thinking.gif" width=140 height=140>
<h2>Science Sites to Visit.</h2><img src="wavy.gif"></center>
<font size=+2><ul><br><dt><dl><a
HREF="http://SchoolNet.carleton.ca"><img src="blue.gif"
hspace=6>SchoolNet</a><font size=+1><dd>This location offers
newsgroups on many topics from student chat groups to professional
development for teachers to project postings. Spend some time looking at
the many Canadian resources that are available here. </dl></font size=+1>
<br><dt><dl><a HREF="http://freenet.calgary.ab.ca/science/tyrrell"><img
src="blue.gif" hspace=6>Tyrrell Museum</a><dd><font size=+1>The tour of
Tyrrell Museum is an excellent resource for grade 8 science, unit 4: The
Earth's Crust.</dl></font size=+1><br><dt><dl><a
HREF="http://www.screen.com/streetcents.html"><img src="blue.gif"
hspace=6>Streetcents</a><dd><font size=+1>This site provides interesting
information that can be used for the Consumer Product Testing Unit in grade
8 science.</dl></font size=+1>
<br><dt><dl><a HREF="http://www.cochran.com/tt.html"><img
src="blue.gif" hspace=6>Theodore Tugboat</a> <dd><font size=+1>Scroll
down to the other sites for children. The Frog Page has a virtual frog
dissection.</dl></font size=+1><br><dt><dl><a
HREF="http://gagme.wwa.com/~boba/kids.html"><img src="blue.gif"
hspace=6>A Ton of Links to Valuable Resources: </a><dd> <font
size=+1>This will connect you to Uncle Bob's homepage. At this time he has
divided it into 7 sections. Each one is worth checking out.</dl></font
size=+1>
<br><dt><dl><a HREF="http://quest.arc.nasa.gov"><img src="blue.gif"
hspace=6>NASA K-12 Internet Initiative</a><dd><font size=+1>This site is
linked to the NASA stations across the US. You can find out about the past
and future space shuttle missions</dl></font size=+1><br><a
HREF="http://www.osc.on.ca/"><img src="blue.gif" hspace=6>Ontario
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Science Centre</a><br><a
HREF="gopher://quest.arc.nasa.gov:70/11/classes_you_can_teach/industry"
><img src="blue.gif" hspace=6>Quest</a><br><a HREF="http://www-
hpcc.astro.washington.edu/scied/science.html"><img src="blue.gif"
hspace=6>More Science Resources</a>
<br><a HREF="http://www.yahoo.com/education/k_12"><img
src="blue.gif" hspace=6>Yahoo Educational Resources</a>
<br><a HREF="http://ekn.sid.ncr.doe.ca"><img src="blue.gif"
hspace=6>Ever Green</a>
<br><a HREF="gopher://ericir.syr.edu:70/11/Lesson"><img src="blue.gif"
hspace=6>Lesson Plans Galore</a>
<br><a HREF="http://bvsd.k-12.co.us"><img src="blue.gif" hspace=6>Math
Plans</a>
<br><a HREF="http://edweb.cnidr.org"><img src="blue.gif" hspace=6>ED
WEB</a>
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HREF="http://www.pathfinder.com/@@@z9eraaaaaaaqcxb/time/"><img
src="blue.gif" hspace=6>Daily Time Magazine Updates</a>
<br><a HREF="http://netvet.wustl.edu/0n:/internet.htm l /"><img
src="blue.gif" hspace=6>ELECTRONIC ZOO</a>
<br><a HREF="http://www.bev.net/education/SeaWorld/"><img
src="blue.gif" hspace=6>Sea World and Busch Gardens</a>
</dl></ol><center><img src="forest.gif"><h2>A Few Other Interesting
Educational Sites</h2></center>
<br><a HREF="http://www.edc.gov.ab.ca"><img src="blue.gif"
hspace=6>Alberta Education</a>
<br><a
HREF="http://www.cs.cmu.edu:8001/Web/Unofficial/Canadiana/README.
html"><img src="blue.gif" hspace=6>Canadiana Reference Page</a>
<br><a HREF="http://www.ncf.carleton.ca/"><img src="blue.gif"
hspace=6>Ottawa FreeNet</a>
<br><a HREF="http://www.isisnet.com/scs"><img src="blue.gif"
hspace=6>Sackville Centennial School</a>
<br><a HREF="http://www.oise.on.ca/pfl/PFL.html"><img src="blue.gif"
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src="blue.gif" hspace=6>Tyrell Museum</a><dd><font size=+1>The tour of
Tyrell Museum is an excellent resource for grade 8 science, unit 4: The
Earth's Crust.</dl></font size=+1><br><dt><dl><a
HREF="http://www.screen.com/streetcents.html"><img src="blue.gif"
hspace=6>Streetcents</a><dd><font size=+1>This site provides interesting
information that can be used for the Consumer Product Testing Unit in grade
8 science.</dl></font size=+1>
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src="blue.gif" hspace=6>Theodore Tugboat</a> <dd><font size=+1>Scroll
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HREF="http://gagme.wwa.com/~boba/kids.html"><img src="blue.gif"
hspace=6>A Ton of Links to Valuable Resources: </a><dd> <font
size=+1>This will connect you to Uncle Bob's homepage. At this time he has
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size=+1>
<br><dt><dl><a HREF="http://quest.arc.nasa.gov"><img src="blue.gif"
hspace=6>NASA K-12 Internet Initiative</a><dd><font size=+1>This site is
linked to the NASA stations across the US. You can find out about the past
and future space shuttle missions</dl></font size=+1><br><a
HREF="http://www.osc.on.ca/"><img src="blue.gif" hspace=6>Ontario
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Science Centre</a><br><a
HREF="gopher://quest.arc.nasa.gov:70/11/classes_you_can_teach/industry"
><img src="blue.gif" hspace=6>Quest</a><br><a HREF="http://www-
hpcc.astro.washington.edu/scied/science.html"><img src="blue.gif"
hspace=6>More Science Resources</a>
<br><a HREF="http://www.yahoo.com/education/k_12"><img
src="blue.gif" hspace=6>Yahoo Educational Resources</a>
<br><a HREF="http://ekn.sid.ncr.doe.ca"><img src="blue.gif"
hspace=6>Ever Green</a>
<br><a HREF="gopher://ericir.syr.edu:70/11/Lesson"><img src="blue.gif"
hspace=6>Lesson Plans Galore</a>
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Plans</a>
<br><a HREF="http://edweb.cnidr.org"><img src="blue.gif" hspace=6>ED
WEB</a>
<br><a
HREF="http://www.pathfinder.com/@@@z9eraaaaaaaqcxb/time/"><img
src="blue.gif" hspace=6>Daily Time Magazine Updates</a>
<br><a HREF="http://netvet.wustl.edu/0n:/internet.htm l /"><img
src="blue.gif" hspace=6>ELECTRONIC ZOO</a>
<br><a HREF="http://www.bev.net/education/SeaWorld/"><img
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hspace=6>Alberta Education</a>
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HREF="http://www.cs.cmu.edu:8001/Web/Unofficial/Canadiana/README.
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hspace=6>Ottawa FreeNet</a>
<br><a HREF="http://www.isisnet.com/scs"><img src="blue.gif"
hspace=6>Sackville Centennial School</a>
<br><a HREF="http://www.oise.on.ca/pfl/PFL.html"><img src="blue.gif"
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hspace=6>Paddle For Life

<a HREF="http://informns.k12.mn.us/mayaquest"><img src="blue.gif"
hspace=6>Maya Quest

<a HREF="OSCKID.htm"><img src="blue.gif" hspace=6>Ontario Science
Centre Kid's Sites
<dt><dl><a
HREF="http://www.cs.uidaho.edu/~connie/interests.html"><img
src="blue.gif" hspace=6>HTML Information<dd><font size =+1>This
location has a wide range of subject area information.</dl>

<dt><dl><A HREF="http://webcrawler.cs.washington.edu/"><img
src="blue.gif" hspace=6>WebCrawler Home Page</A><font size
=+1>
<dd>I find this to be an excellent search tool. Here you may type in
the item that you wish to find out more about and it will return a list for
you.</dl>

<dt><dl><a HREF="schnet.htm"><img src="blue.gif"
hspace=6>SchoolNet's Science Resources<font size =+1><dd>From here
you can go to Science Hobbyist to the Science Education and scroll down a
little until you find Bill Nye TSG and Beakman's World. You will find some
excellent activities to do at home.</dl>
<p><img src="mail.gif" hspace=6>If
you have questions or comments, please contact <a href=mailto:
slewis@ccinet.ab.ca>slewis@ccinet.ab.ca.

Welcome to a Tour of the Internet

Science Sites to Visit.

- SchoolNet
  This location offers newsgroups on many topics from student chat groups to professional development for teachers to project postings. Spend some time looking at the many Canadian resources that are available here.

- Tyrell Museum
  The tour of Tyrell Museum is an excellent resource for grade 8 science, unit 4: The Earth's Crust.

- Streetcents
  This site provides interesting information that can be used for the Consumer Product Testing Unit in grade 8 science.

- Theodore Tugboat
  Scroll down to the other sites for children. The Frog Page has a virtual frog dissection.

- A Ton of Links to Valuable Resources:
  This will connect you to Uncle Bob's homepage. At this time he has divided it into 7 sections. Each one is worth checking out.

- NASA K-12 Internet Initiative
  This site is linked to the NASA stations across the US. You can find out about the past and future space shuttle missions

- Ontario Science Centre
- Quest
- More Science Resources
- Yahoo Educational Resources
- Ever Green
- Lesson Plans Galore
- Math Plans
- ED WEB
- Daily Time Magazine Updates
- ELECTRONIC ZOO
- Sea World and Busch Gardens

A Few Other Interesting Educational Sites

- Alberta Education
- Canadiana Reference Page
- Ottawa FreeNet
- Sackville Centennial School
- Paddle For Life
- Maya Quest
- Ontario Science Centre Kid's Sites

- HTML Information
  This location has a wide range of subject area information.

- WebCrawler Home Page
  I find this to be an excellent search tool. Here you may type in the item that you wish to find out more about and it will return a list for you.

- SchoolNet's Science Resources
  From here you can go to Science Hobbyist to the Science Education and scroll down

a little until you find Bill Nye TSG and Beakman's World. You will find some excellent activities to do at home.

 If you have questions or comments, please contact slewis@ccinet.ab.ca.

3. Acceptable Use Policy

**********SCHOOLNET USER AGREEMENT**********

In consideration for the use of the SchoolNet Computer System, or an Internet account sponsored/subsidized by the SchoolNet Program or Eastview Community School, I understand and agree to the following rules of conduct:

1. That these are the "rules of conduct" for the SchoolNet user group of accounts.

2. That Industry Canada and the service provider reserve the right to change the rules at anytime.

3. That Industry Canada and the service provider reserve the right to remove any user who breaks these rules.

4. That Industry Canada and the service provider do NOT warrant that the functions will meet any specific requirements I may have; nor that it will be error free or uninterrupted; nor shall they be liable for any indirect, incidental, or consequent damages (including lost data, information or profits) sustained or incurred in connection with the use of, operation of, or inability to use the system.

5. That I am responsible for my computer account and for any use made of that account.

6. That I will not allow another person to use my login (ID) and password.

7. That I must not intentionally seek information about, browse, obtain copies of or modify files, passwords, or tapes belonging to other people, whether at Carleton University or elsewhere, unless specifically authorised to do so by those individuals.

8. That I must not try to obtain system privileges to which I am not entitled.

9. That I must not attempt to decrypt encrypted material unless authorised to do so.

10. That I must not exploit any gaps in security, and furthermore any security holes which I find I must report immediately to the proper authorities.

11. That I must refrain from sending or receiving inappropriate images, sounds, or messages which might be considered harassing.

12. That I must refrain from tying up computer resources for frivolous reasons. e.g. chain letters, game playing, printing a single document multiple times.

13. That I am responsible for assessing whether or not a program(s)/data has copyright on it.

14. That if I have information which is stored on the system and is critical to my work it is my responsibility to back-up such information.

15. That I am responsible for the content of messages sent by mail or as electronic postings and must therefore meet standards as if they were tangible documents.

16. That I will not create, delete or alter any electronic information contained in or posted to the service provider's computer or any affiliated network. This will be considered forgery if it would be considered so on a tangible document or instrument.

17. That I should know that there are Federal, provincial, and local laws

which specify appropriate usage of computers and other telecommunications equipment.

18. That offenders will be dealt with by the school administration.

I _____ (please print clearly) understand the above rules and agree to conduct myself according to them.
Signature: _____

Date: _____.

This is a modified copy of the Acceptable Use Policy that is available at http://www.mvhs.edu

APPENDIX VIII

Glossary

Glossary

Several terms are used throughout this study. The terms are defined below for the convenience of the reader.

Browser Programs: Mosaic and Netscape are two common browser programs used to access the World Wide Web (WWW). A browser program can link text, graphics, sound, and video that are located on computers around the world. Each provides a menu of information on your computer from which one may choose what to view. Selecting an item may take one to another computer without the viewer even knowing it. The user no longer needs to know where the information is located, the browser program with WWW will find it with a click of the mouse.

Dedicated phone line: A phone line that will be used only by the modem for networking.

Educational Telecommunications Systems: A collection of four separate components; the hardware (computer and modem), the software (the programs needed to operate the hardware), the network (the linking of the computers for carrying the correspondence), and the people we are contacting and working with through the network (Duning, 1993, p. 2).

E-Mail: Electronic mail (e-mail) is a method of sending a private message to someone else on the network so that they can read it at their own computer. The message travels rapidly from the sending to the receiving computer.

HyperStudio: A multimedia presentation program that can incorporate video clips, sound, digitized photographs, scanned images, graphics and text.

Hypertext: Hypertext allows a viewer to read through a document and skip to another location in the document or to a new document by using the mouse to click on the an active link. These links allow the user to find more

information on a subject and then return to their original spot.

Hypertext Markup Language (HTML): HTML is the computer language added to a text document to enable Netscape to translate the script into graphics and links.

Information Literacy: The ability to acquire, critically evaluate, select, use, create and communicate information in ways that lead to knowledge and wisdom. (Ontario Ministry of Education, 1995)

Internet: A worldwide system for linking smaller computer networks together regardless of the diverse hardware technologies so that they can "function as a coordinated unit" (Comer, 1992, p. 1). Internet is actually a "network of networks" (Kehoe, 1992, p. 8). It is not a network on its own. Elmer-Dewitt (1994) explains the Internet as "a global network of networks that links together the large commercial computer-communications services as well as tens of thousands of smaller university, government and corporate networks" (p. 40). The Internet "allows researchers at connected institutions to share information with colleagues across the country as easily as they share it with researchers in the next room" (p. 2). "The Internet has become a major global infrastructure for education, research, professional learning, public service, and business and is currently growing at the rate of about ten per cent per month" (Sellers, 1994, p. 2). Communication on the network is done in "real-time" which means that there is no time delay. If you are communicating with someone in Japan, what you type on your screen will appear on theirs as well. "There is no one organization you can call to complain about the Internet. According to Hesslop and Angell (1993) there is no one governing body that approves or disapproves of what goes on, on the network" (p. 1).

Modem: A modem is a means of converting digital signals from the

computer into analogue signals that may be transmitted by telephone lines (Jordan, 1983, p. 70). The networked computers interact through telephone lines so that they can take advantage of existing technology and span great distances without compromising the speed of communication.

Multimedia: Multimedia refers to using a variety of means of communicating information. For the students final project they will have the choice of using digital cameras, scanners to input their hand drawn pictures, graphs or maps, video clips, sound, word processing and graphic programs to produce an information package that will inform the viewer about their findings on asthma.

Network: A communications system that links two or more computers so that information can be shared between the operators. A network is an electronic link between computers. The network may be formed between computers within one building, local area network (LAN), a district or worldwide, wide area network (WAN). The advantage is that students and teachers may work together on joint projects, share ideas and information, share hardware and access data banks. The possibilities are endless (Austin, 1993, p. 57).

PPP (Point to Point Protocol): These connections allow one to dial in to an Internet provider that will allow computers to connect over the phone lines so that it becomes a part of the Internet. Mac computers generally use a PPP connection.

SchoolNet: A government initiative that was implemented so that Canadian schools would be able to access the wide array of information available through the Internet, collaborate and communicate with their peers across Canada, provide opportunities for teachers to communicate with their colleagues as well as making available many Canadian resources to the

classroom.

Telecommunications: A means of linking people using electricity. Telecommunications range from listening to the radio, using the telephone or facsimile machine or linking computers. For the purpose of this thesis telecommunications refers to the last example, linking computers.

World Wide Web (WWW, Web or W3): This menu system draws resources from all over the world into a series of menu screens. This system employs pointers or links which allow the user to access the information they want by clicking on the word or graphic that is highlighted. One can use the WWW to download programs, to do searches of the Internet, to log on to remote computers and to read newsgroups. Using one program one can access the many aspects of the Internet.