PEDAGOGUES' PERCEIVED TECHNOLOGICAL NEEDS: A QUALITATIVE ASSESSMENT

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Dedication:

This paper is dedicated to the coming generations of teachers and students who will face the challenge of selecting appropriate uses of technology in their pedagogy. Computers have made more information available, have made documentation easier and have allowed global conferencing for millions of people. Education is very different today from what it was at the turn of the last century, and schools will likely continue to evolve into the next century. The challenges are great and many.

Abstract

This school-based study arose as a result of one secondary school's application to their

District Technology Coordinator for further funding for technology. A need was perceived

to keep pace with advancing technology by our administration, and by a group of teachers

in the school. There are also new courses which are mandated by the province which

required internet browsing capability and graphics programs which were beyond our

current resources.

A summary of the goals of the District Coordinator and the District Technology

Committee are summarized in this report. A history of the development of technology in

the school is described within the context of programs and people.

Participant and non-participant observations were made by the author over the course

of discussions with staff from January through March of 1999 regarding pedagogical

concerns with technology. A survey was also used to determine the staff's perceived needs

in the area of technology that was developed by the author and school technology

committee.

Acknowledgements

Many thanks to Dr. Rick Mrazek for developing the "on-line" course in evaluation which provided much of the necessary background, and personal technology skills that I needed to complete this project. The helpful, guiding comments from Rick led me on paths that changed my own view of technology from that of a cautious user to that of a regular user. And thank you to Leah Fowler for the reading and feedback.

Thanks also to Colleen, Jordan, and Jasmine for providing me with support and understanding through the process.

My colleagues at the school were more than helpful, and it is our emerging skills and literacy in technology that we continue to develop and demonstrate that will take our students into the next century. Technology has become a tool for use in teaching, it has been integrated into our culture, it is here to stay, and its uses have not all been clearly defined in education as yet. The questions that we will have about technology in as few as five years do not even have frames of reference or a vocabulary to describe them today. This study will hopefully serve as a record of what questions we had and how we answered them as those new questions arise.

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CHAPTER I

INTRODUCTION TO THE PROBLEM

The nineteen ninety's have seen an escalation of computers in schools and businesses

in Canadian society. The impact of the use of computers has been described in many ways.

They have been likened to a second industrial revolution in which information is being

multiplied in much the same way as machines multiplied production of products over 100

years ago (Pastore 1979). Mitchell (1982) considered the impact of computer technologies

as similar to the changes created by the invention of the printing press 500 years ago.

The impact of this rapid introduction of computers has affected most areas of our

society. The Science Council of Canada's 1985 report, "The Uneasy Eighties: The

Transition to an Information Society," described the impact of computer technologies on

traditional work situations and determined that computers would cause the emergence of a

society which will be radically different from what people are accustomed. (Cordell, 1985)

Our School Board and schools are changing their mission statements to reflect the

changing needs of students in this changing society. Other schools have also initiated new

directions in their missions and some examples include:

"To provide for the understanding and use of current technology by staff and students"

(Independence Community Schools (1999),

"The Spring Branch Independent School District will incorporate technology as a

natural part of education through an integrated, comprehensive framework to govern

acquisition, application and evaluation of technological resources to ensure that all students will have the opportunity to develop lifelong learning skills necessary to be productive citizens in an information-driven, global society." (Spring Branch ISD 1999).

The major use of computers in the 80's in Canadian schools was for the teaching of computer programming (Scott, p. 42). The point of teaching programming was the assumption that a knowledge of computer programming would be an integral part of a using computers. Recent developments in software and "user friendliness" of computers has precipitated a shift from programming application as a focus in schools. It is no longer necessary to understand the logic of programming to use computers. Very young children are able to navigate the internet, open the World Book Encyclopedia, and use word processors with minimal introduction to the use of the necessary software.

There are many important issues which come with the proliferation of computers in education and in society. Marita Moll has suggested that there never has been a technology introduced which has produced more jobs. She contends that Canadian culture is at risk, that the middle class will continue to shrink and that knowledge management will be in the hands of big business, instead of educators (Moll, 1997 pp15-24). Other issues include how school boards will approach shrinking budgets and the perceived need to keep pace with the advancing technology. Some schools do not have adequate budgets to install electrical outlets to power computers, let alone purchase new machines. (Moll, 1997 p.49). There are also issues surrounding what school boards may do to address their budgets should schooling become information management only.

In BC, the provincial government recently put many courses on-line through computers to students. The questions of teaching multiple intelligences (Gardner, 1994) and cooperative learning techniques comes into question, as does the consideration of what learning, teaching and schools should become. Other issues involve conflicting research which describes the benefits and consequences of computer use by children on their intelligence, social well-being, and their potential for a likely livelihood into the next century. Teacher evaluation and employment readiness related to technology are also hot issues just coming to the front line of many teacher organizations. I suspect that the interest that teachers took in the survey (appendix p.1) is a result of the perceived need to keep step with technology, if for no other reason than because such knowledge will be necessary for employment.

The research questions addressed in this needs base-line assessment are:

1. What are the teachers' and administrators' perceived technological needs for the school?

Within the report, an ethnographic study also took place investigating the following:

1. Is there a teacher technological culture present in the school?

2. What are the teacher's attitudes regarding technology

This study was an investigation of the collective and individual beliefs of high school teachers regarding computers. It examined high school teacher computer use in terms of the meanings teachers attach to computer use. Since teachers tend to be the "front line" in education in implementing curriculum, new teaching strategies, and evaluation, it seems prudent to consider their perspectives regarding these issues and the proliferation of

technology into schools. The remainder of this chapter describes the study and the

research perspective that guided it.

Significance of the Study

The teaching staff of the high school in this study ranges in experience from zero years

to over thirty-five years in teaching over fifty-five staff members. In the past five years,

there has been an eighty percent change in staff, due to retirements, moves and deaths.

The average age of the staff only eight years ago was forty-seven, with the youngest staff

member thirty-five. Today, the average age of the staff is thirty-six with the youngest

member at twenty-four. The principal of the school retired after thirty-five years in the

position only five years ago, making way for a principal with a new agenda for change. In

the past five years, the school has developed a new quarter semester (Copernican)

timetable, the introduction of the internet into the school, major acquisitions of technology

throughout the school, much new staffing as mentioned, accreditation, and the further

evolution of Career Preparation programs. The average student marks have gone up in

every subject area (or at the least have remained constant) and the dropout rate has

decreased as measured by quarterly reports. A more detailed description of the school will

follow. The positive changes in the school may be attributable to the new timetable,

technology, new staff, new leadership or a combination of these factors. Central to these

changes are the teachers who are the front-line workers in the school; they work with

students on educational plans, and guide students through their learning programs.

Teacher attitudes and philosophies toward technology are varied and change as the

technology is further implemented. Computers are no longer cloistered into labs for only

the initiated. The new teachers are arriving to the school with skills in using computer

applications for administration of their courses and for use as instructional aids. Many

experienced teachers went through the evolution of computer technologies from the early

Apples through G3's and Pentium III's. Unlike much of society's demographics, the older

teacher often is very computer literate and experienced through years of computer use at

home and school. Our school district is in fact developing evaluation tools and upgrading

opportunities for teachers to develop skills in integrating technology into school programs.

The attitudes and philosophies of the teachers will affect the rate and success of

implementation. As an investigation into teachers' perceptions of the satisfactions,

frustrations, and valued experiences of educational computer use, this study provides

information that can be used in the successful application of additional technology.

A Rationale for a Qualitative Study

The study of attitudes and philosophies is often accomplished through the use of pre-

designed attitude inventories or questionnaires to collect information. The data is then

analyzed using a variety of statistical techniques. The results of the analysis are then used

to support or to reject an hypothesis or a null hypothesis. The intent of this study was to

elicit the perceptions that educators have of technology. The hypothesis is that there is

meaning today for those educators, and that there is a variety of philosophies regarding

the use of technology among teachers in a single school. Further, I hypothesize that there

is a subculture of technology users in the school. A questionnaire, or inventory study

would not allow for a complete painting of the picture of the meanings that teachers attach to technology. Although the developed survey does address the needs assessment.

A qualitative research methodology allows for the study of individuals who are involved in a given situation, with a holistic description of the situation and dynamics therein (Goetz & LeCompte, 1984). Of the qualitative research methodologies commonly used, the ethnographic method was used. In ethnographic, the whole of the entity or situation is studied. The data collected during qualitative research "...has been termed soft, that is, rich in description of people, places, and conversations, and not easily handled by statistical procedures" (Bogdan & Biklen, 1982, p. 2). The qualitative methodology also allows for the development of the direction of the study to proceed and change with observed observations within the study (Eisner, 1998). Because technology is rapidly advancing, philosophies are not static, nor are methodologies of its use. A qualitative approach allows for observation of changes in perspectives over the course of the study, and allows for the development of new questions as the study progresses.

Qualitative research techniques concern themselves with the subjective interpretations and meanings attributed to a situation by its participants. Quantitative techniques look at empirical realities which establish statistical correlation's that are empirically verifiable. These statistics from quantitative research techniques are then used to generalize behaviors to a larger population. Qualitative research, on the other hand, looks at a situation from the inside with the objective of understanding the events as seen by its participants (Goetz & LeCompte, 1984, p. 3). Understanding cultural situations from the inside is essential as was determined by cultural anthropologists. If ethnographic studies

were to truly reflect the reality of a culture, they needed to be much more than mere catalogues of the material culture and behaviors observed during fieldwork (Bogdan & Bilken, 1982, p. 8). Ethnographers expanded their studies to include the meanings that cultural items and processes had for the group, as well as the observable behaviors. The ethnographer attempts to present an inside view to analyze the culture in as holistic a sense as is possible.

The term "culture" has meant many things for anthropologists (Winick, 15, p. 144). There are however common elements among definitions of culture (Chambers, 1985, p. 4).

1. A belief that culture is shared and therefore is attributed to groups rather than individuals.

2. Culture can be transmitted or communicated from one generation to another.

3. Culture refers to the ideas and standards that guide peoples' behavior.

4. A study of culture involves the interpretation of the phenomenal world; it involves the meanings that people ascribe to things and events.

All aspects of culture as defined above will be investigated in determining if a subculture of technology users exists in the school.

The benefits of using a qualitative approach in this study include the ability to gain descriptive data from interviews, observations and conversations with teachers. The ethnographic nature of the research allows and requires the researcher to be immersed in the culture which is under study through participant observation and interviewing. The

holistic approach to ethnographic research ensures the insider perspective in developing an accurate picture as seen by the participants. Finally, the use of a cultural perspective allows the researcher to examine both the processes of the group experience and the meanings these processes have for individuals.

Design of the Study

This section describes the research methodologies that guided the study. Also included in this section is a description of the setting of the study, the limitations of the study, and a definition of terms.

The methodology for this study included participant and non-participant observation, surveys in hard-copy and on the internet and the use of open-ended interview questions. The data was recorded in the form of field notes, completed surveys and taped converstions and interviews. The notes were analyzed using the methodologies of typological analysis, analytic induction and key word identification. All the information gathered in the study is public domain and is available to anyone. All responses are anonymous.

Since the researcher is the primary instrument for data collection in ethnographic research, biases can arise which threaten the validity of the study. One method of limiting the threat inherent in the researcher's incorrect or inaccurate observations is that of triangulation. Unfortunately, this was not always possible in the setting of the study resulting in some subjectivity. This refers to a procedure in which descriptive data from different sources are used as a cross-check to ensure that the description of the

phenomenon under study is accurate. Also, cross comparison of respondent interview responses with researcher observations was used as a means of triangulation. Another method used to increase validity is through research of similar studies and use of backup references.

Setting

The school is a senior secondary school with 869 students and 55 teachers, with four teaching assistants, six clerical workers, seven custodians and three administrators. It is located in British Columbia and works with a provincial curriculum. It has 40 classrooms a newer gym, a classroom theatre plus a 600 seat theatre, fully equipped shops, three computer labs, and an alternate education facility off campus. The facility is approximately thirty years old.

The school mission statement as developed through an accreditation process in 1998 is:

"___ is a safe, caring and respectful community, which enables quality, relevant and individualized learning." (school mission statement document, 1998) The mission statement is supported with the following:

"We value:

*The right to learn in a safe, supportive environment that promotes respect, kindness, understanding and personal health.

*Open and effective communication which respects the feelings and views of others.

*Shared leadership and decision making that is in the best interest of all

students.

*All members of school community as unique individuals.

*Learning as a lifelong process.

*Intellectual, social and career development.

*Integrity and democratic ideals.

*Learning that is challenging, interesting and personally relevant.

*Education as the individual and shared responsibility of students, school,

parents, government and community.

*Enabling students to apply the skills of critical and creative thinking,

communication and decision making to all aspects of their lives.

*Preparing students for global, national and local responsibilities and

challenges.

*Enabling students to plan, direct and reflect on their own learning."

(school mission statement document, 1998)

The school also has many co-curricular programs that reflect a belief in the mission

statement..The term "co-curricular" refers to the "extra" that teachers do to enhance the

education, growth and development of students. Field trips in regularly scheduled classes

are as important as the teams or clubs that operate throughout the year. Virtually all

teachers are involved, in some way, with the school's co-curricular programs.

The school offers a wide range of provincially authorized, as well as many locally

developed, courses. Teachers use local businesses and the surrounding environment to

support the curriculum and provide a greater opportunity for students to achieve the

desired learning outcomes.

The athletic program of the school provides students the opportunity to participate at a high level of competition within the Western Provinces and the U.S. Coaches donate thousands of hours to the development of each player in the area of sport specific skills, sportsmanship, leadership, critical thinking, social skills, attitude and teamwork. The practices, the games and the travel, all play an integral part in the learning. The school offers opportunities for both men and ladies in soccer, volleyball, basketball, cross-country running, track and field, badminton, curling, swimming, bowling, baseball, rodeo, field hockey and golf.

Students can be involved in various groups such as student government, student voice, counter attack and grad council. With the help of staff sponsors, students work on leadership, planning, decision making and implementation skills.

The value-added wood forum group which encourages creative uses of wood resources has been in operation for four years. The school group is the leader in the wood forum competitions winning all of the major awards for three years.

Intramurals allows all students the opportunity to be involved in some group game or competition for fun. The leadership and community recreation classes work closely with the teacher to offer a variety of activities throughout the year. Most activities take place during the lunch hour.

The school music and drama programs involve nearly one third of the student population. In music, there are jazz bands, jazz choirs, a regular band, a regular choir, music composition and various smaller ensembles. In drama there are acting and stagecraft

classes as well as numerous opportunities to travel to competitions, performances and festivals. There are generally two annual major productions in the 600 seat theatre which involve an average of 50 students in each production.

Other groups that students are involved with include: demolition derby and stock car racing, computer technicians, audiovisual, yearbook, math competitions, art exhibits, essay competitions, peer tutoring, peer counseling, and volunteering for the school and community.

The staff at the school is committed to producing well-rounded individuals who have a variety of strengths. They believe in lifelong learning and therefore work very hard to provide the necessary tools for this to occur.

The school has approximately 450 students involved in twenty-one career preparation programs. Teachers and students work closely with the community to ensure quality, relevant instruction and worthwhile work experience placements. Students who successfully complete all of the requirements of the program get acknowledgment on their transcript, and may receive credit and/or preferential treatment at a post-secondary institution. Presently, the school has several articulation agreements with the local college. Many students have been able to gain employment as a result of their successful work experience or because of their related course work. Also, many students have gone on to study in the field of their career preparation program.

The number of programs is necessary to provide opportunities for all students. The school continues to develop new programs and to evaluate older programs to ensure that they are meeting the career needs of the students. This is evident in the growth of some

newer career preparation programs and the decline in numbers in some of the older programs.

In the area of special education, the school operates a combination integrated and home-based program. It tries to meet the needs of many different challenges faced by the students. Students develop an individual educational plan and take part in regular classes, which have been modified or altered, to challenge the student, but also provide the opportunity for success. The program offers as many community-based activities and work experience opportunities as possible. The school has identified approximately 200 "at risk" students. The types of students in this group are generally low achievers and often suffer from one or more of a variety of learning disabilities. The students are identified by recommendations from the Junior High Schools, previous schools out of district, testing, and parents, students and/or teacher referrals.

The school uses a model where learning assistance teachers go into classrooms and assist all students as needed. Also, they work with the classroom teachers to modify or adjust curriculum and teaching strategies to better meet the needs of "at risk" students. There is also a room available for students to go for extra help, special test writing or computer assisted instruction. Over the past three years, the students identified as "at risk" have successfully completed approximately ninety percent of their courses.

The school has a technology committee which developed a vision and is working through its implementation plan. The committee has been operating for the past eight years. In the past three years, two tasks that were completed with very little capital were two cart projects. One involved a portable computer with a large screen television and a

printer. This allowed teacher to begin to experience the many possibilities the computer has to offer. This has been used mainly in the Science and Math areas. The second project involved a class set of word processors, a cart, a computer to download text and a printer. This has been centered in the library and is used extensively with the Humanities. Both of these projects are very successful and have taken technology into classrooms where it was virtually nonexistent three years ago.

With the introduction of the new Integrated Resource Packages from the Ministry, it became clear that the school was not in a position technologically to offer many of the required learning outcomes. Money was not available from the district or the government to provide the necessary upgrades. The Technology Committee and the Administration felt they could develop funding from the private sector. A partnership was developed with the local Credit Union to provide the school with and $80,000 loan interest free for four years. Payment would be $20,000 at the beginning of each of the four years. With this amount, a new computer lab was installed with newer computers.

The other goals of the committee are to provide all students access to the internet and to have computers in all classrooms. These plans will be closer to reality with the development of a partnership with the National Computers to Schools Program. The school students will be working with this organization to refurbish computers and make them available to all schools in the district.

Presently, the school has CAT-5 wiring to each classroom, internet access to the school network, a 486 lab of computers, several pods of Pentium computers throughout the school and numerous stand-alone configurations used for a variety of student and staff

needs. In addition, there are many other forms of technology being used in the school, such as scanners, digital cameras, midi equipment, audiovisual equipment, automotive equipment, and video-conferencing capability.

In actual numbers, in the area of hardware, available to students and staff, there are two Apple II's, twenty-five 286's, seventeen 386's, fifty-seven 486's, thirty-seven Pentium's, three Pentium II's. Hardware dedicated for administrative use include one Apple II, five 386's, twelve 486's, thirteen Pentium computers, and one Pentium II. There are also nine scanners, fifty three CD ROM's, fifteen laser printers, four digital cameras, three special video cards, eleven ink jet printers, four video cameras and over forty televisions. These numbers change daily, with the purchase of new equipment. There is also a "computers for schools' initiative where our school plays a primary role. The district has acquired sources for used 486 computers from business and our technology classes rebuild the boxes and install network cards. The computers are then distributed throughout the school and the district. To date, there have been four elementary labs of 486's installed, and there appears to be no limit to the number of these "free machines."

It is anticipated that the district's technology co-ordinator will be able to help the school achieve the technological goals so the school can meet the demands of the PLO's (Prescribed Learning Outcomes) of the various IRP's (Integrated Resource Package).

The school operates with a Copernican style timetable. Classes are comprised of a single one hundred and forty minute class in the morning and another one in the afternoon. In addition, there is a thirty minute tutorial block in the morning between the morning class and the lunch hour. Also, each class has a ten minute break half way through.

Students generally take two classes each quarter. Many of the students take nine or more courses in the year because of the course offerings outside the regular timetable.

Students are made to feel welcome and are respected at the school. Teachers and administrators are often in the hallways before school and during the breaks. This visibility helps students to feel safe and promotes a caring environment.

When classes are in session, administrators, counselors and learning assistance teachers are often visible in the hallways and in classes speaking with students. Teachers are using a variety of teaching strategies to implement lessons.

Generally, there is a good feeling amongst students and staff about the school. There are areas of concern, but there is an overall good tone to the school. Some areas of concern include the need for a teaching kitchen/cafeteria/student lounge and parking for students and visitors.

The school is committed to continuous improvement in the area of academic achievement. Students are expected to be active participants in their learning by way of attending classes regularly and on time, staying up-to-date, completing homework assignments, and seeking help when needed during class, tutorial or some other prearranged time. Teachers are expected to use a variety of teaching strategies to address the different learning styles found in each classroom. To further support and recognize academic excellence, the school offers students advanced placement opportunities in a variety of curricular areas. In addition, in early June, the school conducts a scholarship, bursary and awards evening for graduating students and an awards ceremony in the middle of September for the previous year's grade 10 and grade 11 students. These awards

programs recognize students in other areas of involvement as well as academic achievement.

Since 1991, in every subject area, students have achieved higher class averages than the provincial average for the given subject. The subject averages have also gained in comparison to achievement to grades previous to 1991. This is most likely due to the implementation of the new timetable, but may also be affected by the introduction of newer technologies, new staffing, and some internal changes in the area of student assistance.

This description of the setting was intended to give an overall perspective on the school as a physical place, and a place in which programs and people meet. Philosophies and expectations were communicated from the administration in a document to the school board in 1998 and were substantiated by staff through interview.

This study took place in only one high school, with only one researcher. The observations regarding the meaning that technology has for teachers in this school may not necessarily transfer to all schools. Also, the study took place over the course of six months, during which time, the meaning and nature of technology and its use in the school evolved and underwent change. New machines are added daily, the school is currently being rewired for a provincial network, and new programs are evolving that utilize the technology. The evaluation that took place is therefore a snapshot. The views of the teachers may be different six months from the completion of the study. The validity of the single researcher's observations also come into question. Also maturation, the process of changes within the individuals participating in the study, resulting from natural biological

or psychological development, will also affect the study.

Definition of Terms

Certain terms used in this document require some definition for clarity of meaning. Some key words have been defined earlier and the following definitions are given as definitions that have meaning today; in the future their meanings may change.

Ethnography: "The purpose of educational ethnography is to provide rich, descriptive data about the contexts, activities, and beliefs of participants in educational settings (Goetz and LeCompe, 1984 p. 17). "The purpose of ethnographic research is to describe and interpret cultural behavior" (Wolcott, 1985, p. 190).

Beliefs: A belief refers to a perceived relationship between two things or between some thing and a characteristic of it. The basis of any belief is assumed to have its origin in the credibility of one's own sensory experience or upon a belief in the credibility of some external authority (Bem, 1970, p. 5).

Opinions: An opinion is an individual's tentative cognitive organization of ideas and constructs regarding a particular stimulus object. Used in this sense, an opinion may be thought of as a cognitive summary. In that opinions may change on the basis of new information and experience, they are thought of as tentative and non-fixed (Cooper and McGrahug, 1968, p. 29).

Subcultural grouping: A subcultural grouping is a social grouping that shares a common set of values and a specialized language (Brake, 1980).

Technology: Today, and in this paper, it is mechanization, and in this study is limited to electronic mechanization which utilizes computer chips for managing information, communication and software. This is a definition that is evolving and this is the definition that was arrived at in the school technology

CHAPTER II

LITERATURE REVIEW

In the 1950s, citizens of the world were looking forward to the futurists' visions of a leisure age due to computers taking on the work load. Robots would wash cars, clean houses and cook, and the Jetson's cartoon featured many inventions that seemed improbable, but have now become commonplace. Through the sixties and seventies computers became more powerful and smaller.

The electronic calculator that commanded a price tag of ninety dollars in 1972 dropped to a mere five, or free with a fill at the local gas station, over the course of six years. In the eighties, computers entered the common workplace and replaced cash registers in most businesses. Their use in banking became more evident and schools entered the computer age (Carroll, 1999).

Donald N. Michael, a social psychologist wrote an article in <u>Newsweek</u> on February 12, 1962 that foretold of the dangers that were inherent in the spread of technology. He predicted that computers would begin a takeover of everything that people did, causing massive unemployment, loss of human values and deep social unrest.

Initially, in schools, the study of computers was the study of how they worked, and how programs could be created to make them work. As processing speeds increased, and user friendliness developed, the study of computers started to include applications. Applications are programs that can be used to write, to make documents, to make video presentations, or do almost anything including designing your garden.

Today, the study of computers in schools has evolved to include the design of web pages, computer repair, graphic design, a myriad of video, sound and multi-media applications, and of course presentation, communication and currently, evaluation techniques. There is even a program developed in 1998 that has been developed by Thomas Landauer, a University of Colorado at Boulder psychology professor, and Peter Foltz, a psycho linguist at New Mexico State University, which is capable of grading written essays. When students in Florida were given a choice of accepting the machine grade their work, or having the professors mark their essays, almost all students chose the machine. Lawrence Frase, of ETS (Educational Testing Service of Princeton, N.J.) predicted a time when computers would look intelligent, but humans would be kept somewhere in the loop of testing (Globe and Mail, Feb. 13, 1999).

Computers also are offering a new mobility for workers. People can collaborate on projects from anywhere in the world together on the internet. In a wired world, computers create the possibility for people to work from anywhere at any time. A new leisure age is truly evolving with people spending more time at home (Carroll, 1999).

In the January 1999 Popular Mechanics magazine, on page 64, Arthur Fisher asked: "Computers and the internet are changing how we teach. Are the results worth it?" He continued to argue that with the billions and billions of dollars that were spent on technology over the past ten years, American youth still lagged behind international standards. Fisher described instances where the internet created a community of learning, where students learned by doing, and by interacting, not by rote instruction. The internet was also used to benefit the community through special projects that were designed to

raise awareness and raise money for cleaning up pollution spills. Words like "collaborative problem solving" appear throughout the article. CD-ROM software is claimed to be obsolete, that telecommunications and the Internet, through networked resources, allow students to link up with working scientists on important projects.

Michael Dertouzos of MIT's Laboratory for Computer Science recently wrote in MIT's Technology Review that the jury is still out on the question of whether computers are truly effective in learning (Fisher, 1999). David Gelertner of Yale has called computers "glitzy toys." Samuel G. Sava, executive director of the National Association of Elementary School Principals, cites research that indicates "37 percent of students have used computers in at least some math work with no improvement in achievement" (Fisher, 1999 p. 35).

Although computers and access to the internet are common features in most schools, they have taken a long and unregulated road to get there. "Technology access is important, but technology alone never makes the difference in student performance. It's equally important to have teachers who are comfortable and competent with technology and who have the right kind of training and support" (Roberts, 1999 p. 98). Teachers have some opportunities for professional development, and one such program is affiliated with NASA's Jet Propulsion Laboratory. Teachers are trained to use computers to analyze information ranging from soil components to urban sprawl. "We do exit polls at the end of the week, and our teachers tell us that they are enraptured by the total program, with many extolling it as the best professional experience of their career. Students are learning in ways never before possible in the K-12 classroom. Education is truly changing"

(Meyer, 1999, p.132).

Is the capital investment in technology worth it? Students who use computers in the

study of algebra do better than those without them (Koedinger, 1999). Also, Westwood

High School, in Austin, Texas, has an integrated program which uses computers

throughout the curriculum and the school, and their SAT and ACT scores are among the

highest in the state (Riley, 1999).

The Apple Classrooms of Tomorrow study, which studied K-12 schools over eight

years indicated significant links between computer assisted instruction and achievement.

Schools with technology integrated also have higher attendance and lower dropout rates,

which leads to greater academic results (Riley, 1999).

Those predictions made by Donald Michael in 1962 appear to be coming true in 1999.

There is indeed a difference between schools that have access to the technology and those

that do not based on economics. In 1994, only three percent of classrooms in the U.S.

Had access to the Internet, and in 1997 27 percent had access. However, in the richest

schools, 36 percent of the classrooms had access and in the poorer schools, only 14

percent had the internet. A household earning more than 75.000 per year has a 75 percent

chance of owning a home PC, while those earning under 10.000 have only an 11 percent

probability. Also, those with college education are ten times more likely to own a

computer than those with eight years of school or less (Dept. of Commerce, 1999). "Until

every child ha a computer in the classroom and the skills to use it...until every student can

tap the enormous resources of the Internet...until every high-tech company can find skilled

workers to fill its high-tech jobs...America will miss the full promise of the Information

Age" (Clinton, 1999, televised announcement) .

CHAPTER III

CONTEXT OF THE TECHNOLOGY MANDATE

Charles Ungerleider, Deputy Minister in charge of Curriculum for the province of BC, conducted a survey of West Vancouver teachers in 1997 regarding their views about their use of computer technology. The teachers were confident abut their ability to address a wide range of responsibilities, including instructing students in basic skills, conducting discussions with and among students, and guiding them to carry out and present research. Nearly one quarter of the teachers indicated that they "followed advances" in the field and "eagerly" seek to apply them.

The West Vancouver teachers mostly used computers in a laboratory setting for the preparation of student worksheets and for writing. The obstacles that were identified were the absence of adequate technology, equipment that does not support current software, poorly functioning hardware and software, lack of familiarity with hardware and software, inadequate preparation for the use of hardware and software, and too little time to practice, apply, and assess the effectiveness of hardware and software.

The teachers felt that they needed to play a larger role in the purchase and implementation and evaluation of technology. They also have a strong desire to discuss the philosophical, ethnical and educational questions regarding the acquisition and use of technology. The following issues were identified:

1. What is the appropriate use of technology in public elementary and

   secondary schools?

2. How can BC ensure the equitable provision of hardware and software

to teachers and students?

3. What steps should be taken to give teachers the opportunity to practice,

apply, and assess the effectiveness of particular hardware and software?

4. What are the negative consequences of using new technologies on

teachers, and students, and how can these be prevented?

5. What steps must be taken to establish a comprehensive evaluation

framework and plan for monitoring the introduction, use and educational impact

of new technologies and software?

6. Is the priority given to technology and its use justifiable in relation to

other valued educational outcomes? (Ungerleider, 1998)

In an attempt to address these concerns for our school district, a district technology

committee with a coordinator was established in 1997, with the mandate of developing a

district technology plan. For the purpose of providing a context for this study, a brief

summary of this plan follows.

There are 23 schools in the five widely spaced communities in the district which spans

over 260 km of highway. The district was recently amalgamated from two former

independent school districts, which now services 7493 students in nine secondary schools,

16 elementary schools and one elementary/junior.high school. The district also includes

three learning centres, one junior alternate and one senior alternate school. Traditionally a

resources based community, the school district is currently undergoing a transition to a

service based economy with concomitant tax consequences.

Belief:

Students and educators need an appropriate degree of skills, awareness and

understanding of technologies in an ever-changing world.

Strategic Vision:

Learners have the appropriate skills, knowledge and attitudes related to technology

that allow them to be successful in an ever-changing world.

Mission:

The school district will provide the appropriate technological support and

opportunities:

1. To enable learners to gain skills, knowledge and attitudes

2. To facilitate meeting the learning outcomes as defined within the curriculum.

Critical Issues:

Upon examining the Strengths and Weaknesses of current technological practices in

the district, three broad categories were identified for immediate attention:

1. Leadership: redefine the terms of reference of the current technology

committee, define the terms of reference of the technology planning committee, and hire

an educator to be responsible for leadership in technology and to chair the district

technology committee.

2. Communication: develop a strategy to explain the rationale of the new plan

and the status of the two previous plans, communicate/explain the technology plan to all

stakeholders, promote e-mail/internet/video conferencing for all employees as a means of communication, communication the need for affordable internet service, develop/maintain a communication process for the technology planning group, develop protocols for district-wide use of technology, promote technology and its use for communication amongst computer using educators in the district.

3. Funding: to secure adequate and dependable sources of technology funding, to lobby the Ministry regarding the problems caused by inadequate funding for technology, to investigate other sources of funding on a continuing basis, to develop a strategy to ensure equitable allocation of funds through a needs assessment, and upgrading wiring, and to investigate more cost effective or alternate technologies to meet needs (District Technology Mandate Document, 1999).

The scope of the committee includes requiring each school to draft and submit its own technology plan to the technology planning committee.

The stakeholders include representatives from all schools, the administration of the district and school trustees. Funding is available through the school district.

The following issues were identified through the committee's work:

What training is needed for staff, time is needed for educators to prepare to use technology, in what ways will technology change the ways that students are taught, how staff development will be evaluated, the development of a medium that encourages peer communication among all staff in the district, and a review of staff recruiting requirements.

The plan is to be evaluated and reviewed by: articulating the technology plan with the district's overall plan, articulating the technology plan with provincial educational goals,

defining the school and district roles in making the plan work, linking district objectives and technology, and measuring the effectiveness of the plan.

In an effort to link the district mandate with the school, a district coordinator has been hired, and has met with our school technology committee. Upon successful development of a needs assessment for our school, and a technology plan developed by our staff, funding will be made available through the coordinator for internet access, complete re-wiring of the school for networking technology, installation of refurbished 486 computers where defined needs are identified, and some limited funding for new purchases through the coordinator's budget of $210.000 which is spread between ten schools. There is also funding available for technological support personnel.

Our school technology committee then developed a survey (Appendix A) over the course of two weeks, and three revisions to address the concerns outlined by the district committee.

CHAPTER IV

SURVEY PROCESS AND FINDINGS

Although a survey is not a qualitative evaluation technique, the survey results are

included in the findings in an effort to validate researcher observations using quantitative

methods. The survey was also key in some of the latter observations by the researcher of

processes in meetings. The survey results are not completely numerical since surveys were

completed by individuals, groups of individuals and responses represent the views of one

or many people. The stakeholders in the survey were the staff, the students and the

administration of one school. The school district is the client for the survey, and has funds

available for release to the school upon a successful application and survey process. The

survey is part of the observations regarding technology of the author in the school and the

research questions as stated at the beginning of this study are addressed. The question of a

technological culture in the school is determined by many of the responses in the survey

and by the percent return of the survey.

There were four surveys completed on the World Wide Web, which included three by

school staff, and one by a student whose responses were very graphically sexual, and

irrelevant. When things are posted on the web in an unprotected environment, all kinds of

responses can be expected, although the student's name was also posted with his

document. There were the 15 relevant survey returns including the three on the web..

Within the 15 surveys, all but two staff member's views were represented. This would

indicate a strong interest in technology. Since the survey was distributed to department

heads for discussion with departments, and there were more responses than departments,

some individuals and groups of individuals chose to share their views independently. This may be because they did not share their department's view, or because they had specific concerns, or because they could not meet with the department before the survey was due for return or possibly because they held membership in several departments with varying concerns.

The surveys were divided between ten staff members participating in the technology committee to determine key word responses and frequency responses from the surveys. Some responses are easily quantifiable, and others were too lengthy for measurable summary. The responses to the qualitative questions are sorted according to the following headings: hardware requested, software requested, professional development, philosophy.

Survey Results:

While tabulating the results of the survey with our technology committee and our administrator, our principal verbalized the following: "We can look for other funding sources as well as district, such as the loan that we received from the local..." "Perhaps some classes will be canceled for next year to save money in those areas to free funding to purchase technology." "Perhaps students will be allowed to take only eight courses in one year (currently, some students take ten or more, mostly in music), and those course allocations can be put toward funding technology."

There is some concern on the part of the author with some of the principal's statements. One staff member did not know how to respond to one of the questions on the survey since the individual felt that a school philosophy regarding technology needed to be

in place prior to answering the question. The principal responded that "philosophy was something that made his eyes glaze over, that what we need are machines, and the philosophy will come." This is perhaps true, but the author believes that there needs to be sound reasoning for implementing technology, through well thought out needs assessments, and school philosophy.

Specific Survey Responses:

A "respondent" refers to a returned survey, which may represent up to eight individuals or as few as a single person. Unfortunately, there was no mechanism in place to determine numbers of individuals represented in the individual surveys, unless departments did so on their own.

In the area of software:

The needs were wide, and program specific. One respondent felt that it needed no software, and all others required software for word processing, virus checking, internet browsing, graphics, and system tools for defragmenting and disc scanning.

Responses for software ranged from CD ROM's, through programs available on the internet, and content across the curriculum.

In the area of hardware:

One respondent representing the fine arts indicated a need for five multimedia computers in the graphics room, one multimedia computer in the music room, an Apple video editing computer on a cart for easy moving to various rooms, and an available lab of networked computers that is bookable. (the current labs are in full use, with no availability to other courses). Other hardware needs in the fine arts included two digital cameras, two

scanners, connecting cabling from computer to television, and one video projector.

Each respondent indicated a need for teacher use only computers for completing marks, submitting attendance, preparing lessons, and research on the internet. In general, most responded that access to a bookable lab was needed for one time teaching of a program for an entire class. Small groupings of computers in every room was identified as a need. Internet access was universal, along with a variety of printers and scanners.

In the area of professional development, the school responded 100% yes, it is needed. The respondents defined their needs as specific to the software that they wanted to implement. They also stated some need for general computer use and maintenance professional development.

In the area of philosophy, the general responses included: availability for all, balancing other educational goals with technological implementation, reasonable spending, and literacy.

Respondents also identified funding sources for technology. The district and school budgets were most often mentioned, with several respondents applying for private grants through a variety of agencies.

The survey addresses the first research question of a needs assessment for the school. The second and third questions of this study of teacher attitudes toward technology and the existence of a technological teacher culture are also somewhat addressed through the survey.

Teachers in this school, like the West Vancouver school district are eager to embrace technology. They are frustrated by technology that "doesn't work." Their answers on the

survey indicate a willingness to learn more about software and hardware, and they see technology as a means to achieving their educational goals for their students. The fact that only two staff are not represented indicates that there is a strong interest in technology and that a perceived need to keep pace is present.

Regarding culture, by our original definition, there is a school technology culture among teachers. Teachers demonstrated a fluent use of a unique vernacular specific to technology. They exchanged knowledge regarding technology between each other and students, and there is meaning in the technology itself for the teachers. This discovery leads the researcher to the observation that the technology is more than a tool, it has become a part of our school culture.

There is a perceived group of technology users in the school which includes all but two of the staff. The collective has technology as the link between all areas of curriculum and study. It was previously difficult to determine a common link between all areas of the school, that included instructional and communication techniques. Technology seems to be a relatively new commonality between all areas, creating a new group.

The students who are coming into the school are increasingly competent in technology. Teachers of computer sciences have evolved in this school from programming and work processing teachers to a confused state of what to teach. One information technology course from one individual deals with the fixing of the hardware and another information technology teacher deals with internet browsing tools and graphics programs. Students are entering with greater skills every year. Programs are becoming more user friendly, and the need to teach word processing and graphics programs is diminishing. Every staff

member has worked on the internet, and every staff member had used computers to prepare grades, write letters, prepare assignments and tests, and every staff member felt reasonably competent in the use of basic computer applications. With the next generation of students, arriving from homes with computers, arriving from elementary and junior secondary schools with computers, the expectations rise, the literacy develops and the culture grows. By the second definition of culture as something transmitted between generations, the technology certainly does qualify.

By the third definition of culture referring to the ideas and standards that guide behavior, there is a computer behavior use code. Teachers in the school do not condone the use of chat lines, profanity, pornography or the waste of technology time. While using technology at school, there are clearly defined rules, ideas and standards regarding its usage. The school developed a user's contract that must be signed by a parent and the student before access for the student to the internet will be granted. Any infringement on the contract results in the loss of internet use by the student. Teachers are bound by a professional code of conduct that includes the communication media of computers as well as verbal, written and physical modes. Specific to computers are accepted values regarding the effects of shared e-mail and confidentiality.

By the fourth definition, "the meaning that people ascribe to things and events," there is a specific language used by technology users. Listing the variety of words used commonly when talking about computers would fill several pages. The uninitiated finds the language difficult and alienating. Computers have the allure of making things "interesting and easier" that attracts people to them. The language becomes worth

learning, and like most language acquisition is often mastered by the very young. Teachers have found the language to be of use since without it they are left unable to communicate with others about technology. The machines have meant a change of work habits, have created daily rituals of checking e-mail, and have also created new meanings in pedagogy.

Multi-media used to refer to television and video presentations in class. Previous to that, multi-media was the slide projector and filmstrip, and previous to that, it was the chalkboard. Today, multi-media refers to an interactive, user selected mode of viewing, responding and interacting. It is driven by computer technology and it is a mode of communication and engagement. Teachers in this study have acknowledged the power of this mode of teaching through their innovative use of the "technology on the cart" in their classes. Almost all teachers have used a lab setting at one time or another over the past two years in their teaching in this school.

All teachers are able to look beyond the presentation of student works to what the student is saying. Computers allow for easy copying from encyclopedias and other sources through cutting and pasting information. Teachers at one time may have been amazed at the new neatness and clarity that students with computers were able to complete essays. Teachers in this study were not easily fooled by fancy clip art, or page design in determining the quality of student thought. The meaning of things and events does play a significant role defining technology as a culture in the school.

CHAPTER V

CONCLUSIONS

This study indicated that there is a specific technological culture among teaching staff at this school. Their attitude toward technology is similar to a double edged sword. Staff has perceived the benefits, but at the same time recognizes the pitfalls. There is no doubt that the technology is here to stay, and that teachers have to keep abreast to do their jobs.

One observation that the researcher has made as a result of this entire study, is that the nature of the teacher as the sharer of information must change across the curriculum. Teachers must facilitate learning; the content of courses and basic information is readily available on the internet and on CD ROM. The pedagogue's role will have to be to lead the pupil through the maze of information to determine what is good and relevant on the internet and from other sources. The teacher will also continue to develop an educational plan for individual learners to address various learning styles. Many people would prefer to play catch with a computer than stare into the screen. The teacher will have to continue to find ways to teach all individuals.

The challenge facing education today is a balance between budgeting for technology and maintaining traditional educational activities, such as the fine arts, physical education, and the practical/industrial arts. The challenge includes addressing learning styles, levels of ability to remain on task, and the timeless truth of teaching that it deals with teaching students, not content or subjects.

At the time of this writing, the district technology committee is in the process of

developing a staff development program. They have identified different levels including:

*Entry: learning the technology basics, simple hardware and software operations. Teachers at this level use technology little, or not at all.

*Adoption: using technology to support traditional instruction. Teachers at this stage have begun to realize the potential of the technology to enhance their own and their students' productivity.

*Adaptation: Integrating technology into existing classroom activities. Teacher identify technology projects or programs that can accompany a unit they are already doing. Use of internet and CD ROM resources are used.

*Appropriation: Developing new approaches to teaching that take advantage of technology. At this stage teachers begin to reconsider the design of their lessons and the objectives they are focusing on, looking for things that technology will allow them to do that they would not have previously considered.

*Innovation: Discovering entirely new uses for technology tools. Here, teachers create new learning environments that inspire creativity, entrepreneurship, collaboration, and other essential skills for the 21st century. They may create web pages, use discussion groups on the internet, tap into experts on the web, or carry out global studies with other groups in other communities.

Workshops for teachers are going to be designed as follows:

*Tier I is basic entry into technology where hardware and software basics will be explored.

*Tier II is the adaptation or appropriation stage.

*Tier III is for developing leaders in schools.

Whether teachers want to or not, they will have to embrace the technology. Workshops may become mandatory with competency testing. This testing of teachers may emerge as one of the new union issues as the workshop policy evolves. Although there are no consequences to not participating in workshops at the present outlined in the district documents, there are definite disadvantages implied in the language used for teachers who choose not to participate..

Our school is fortunate in that the teachers are comfortable with change and are familiar with new technologies. The teachers are interested in applications of technology in their classrooms and have integrated the technology culture into the culture of the school. Implications for the future include a plan for further implementations of technology throughout the school. Our school plan is attached in Appendix B as evidence of some form of thought out direction for technology for our school for the future. We have in the school individuals who think through philosophies of technology use and we also have those who view more hardware as greater use.

Given our school district's desire to develop leaders in technology use through its three tiers and the encouragement of individuals from entry through innovation levels of use, it is evident that schools will experience broader ranges of computer usage than we can currently imagine. The actual learning that takes place as a result of greater use of technology is not in debate in this paper; it will be likely that if teachers continue to embrace the technology, it will be as a result of greater learning opportunities for students.

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Appendix A

Technology Survey

Technology: Is always changing and is difficult to define specifically. It may be items with a computer chip or things connected to those items.

Use this form, or attach your own notes.

1. Where does technology currently play a role in "making your job easier?" Please list as many teaching situations as possible specific to your area.

_____

_____

_____

_____

_____

_____

2. What resources do your IRP's call for? For a successful proposal, we need to be as specific as is possible.

COMPUTER/SOFTWARE_____IRP_____

_____

3. What equipment is your department lacking in order to fulfill IRP's?

4. What arrangement of technology would suit your course delivery to fulfill IRP's? Mini-labs, cart holding tv with internet access, keyboards on a cart, full internet lab in a separate room, single computer networked in a room, stand-alone computer, three computers in the room, a new overhead projector, other? Why? Please be specific.

5. What would you like to see as a school philosophy regarding technology use?

Appendix B

School Technology Plan

<u>Phase I   1995-1999</u>

*Support IRP requirements of Business Education Courses

Strategy_

 Upgrade Business Ed. Lab to 286's

Funding_

 In-School transfer of equipment

Progress

 Completed 1995/96

*Support IRP requirements of Computer Science and Info. Tech Courses

Strategy

Upgrade Info Tech Lab to 486's

Funding

Career Prep Info Tech Dept. Budget

Progress

 Completed 1995/6

*Provide open access to word processing

Strategy

Upgrade 8088's in Library to 286's

Funding

In-School transfer of equipment

Staff Development

In-service provided in-house for word processing programs

Progress

 Completed 1995/96

* Provide open access to word processing, marks programs and career programs and

Internet

Strategy

Upgrade Library Lab to 486's and Pentiums

Funding

 Computers for Schools Library Dept. Budget

Staff Development

In-service provided in-house for marks programs and Internet

Progress

Completed 1999

* Provide school-wide access to the decision-making process regarding technology in the

school

Strategy

Establish Technology Committee and expand it to become Technology Users'Committee

Funding

No cost

Staff Development

Committee meets regularly, all staff may become involved

Progress

Technology Committee established 1996/7

Technology Users' Committee established 1998/99

* Provide a common network for the school

Strategy

Wire School

Funding

Career Prep Budget

On-going. Visual Arts, Drafting and Lab 123 yet to be done.

*Provide technical and educational support for technology users in the school

Strategy

Create a .429 FTE position as a Technology Resource teacher

Funding

staffing budget

Staff Development

Network training courses provided for Office Administrator

Progress

Position created and filled 1998

*Establish a stable computer network running word processing, desktop publishing,

marks programs, Career search and the Internet

Strategy

Set up a LAN running all these programs. Establish staff and student

access to Internet and

Funding

Community partnership with Credit Union and secure and interest-free

loan for $90,000.

Staff Development

Pro D. Sessions in 1998 and 1999. In-house training sessions.

Progress

Established 1999

*Support technology requirements of Business Ed. IRP

Strategy

Purchase TV/computer demo cart with Internet capability and run Business

Ed. software

Business Ed. Dept. previews software

Progress

Completed 1999

*Support IRP requirements of courses situated in classroom on main floor

of school

Strategy

Purchase a demo cart including TV, Pentium to Internet hook-up

Staff Development

Staff preview software as required. In-house demonstrations by Dept.

Progress

Completed 1999

*Provide all students access to word processing at home and at school

Strategy

Purchase cart storing 24 keyboards, Pentium to TV/Internet hook-up and printer.

Library circulates keyboards.

Funding

Accreditation funds Library Dept. Budget

Staff Development

Demonstrations held at staff and Dept. meetings, PAC and parents' nights and in classes.

Progress

Completed 1997

*Provide office/administration with electronic communication to the Ministry and

increase support to staff and students

Strategy

Upgrade office computers to allow Internet access to Ministry records, email and student

records programs.

Budget

School operating funds

Staff Development

Office staff training provided for new software.

Progress

Completed 1997/8

Phase II

*To provide improved staff access to word processing, Internet, marks

programs, student demographics/records.

Strategy

Place 16 upgraded and networked 486's on teachers' desks. Network to

run word processing, marks programs, Internet, email and access for office/admin.

Funding

Computers for Schools Targeted Ministry Funding $12,000.

Staff Development

In-house training to be provided by Technology Resource teacher or other staff.

Progress

Proposed for June 1999

*Support Teacher/Student access to printers.

Strategy

Place networked printers at approximately 6 locations in the school.

Budget

In-house redistribution of current equipment. Purchase 3 new printers.

$5,500.

*Support IRP for Information Technology courses

Strategy

Upgrade as many 486's as funding will permit.

Funding

Targeted Ministry Funding

*Support school-wide use of software

Strategy

Acquire site-licenses and legal software for all operating systems, anti-virus programs and other widely-used software.

Funding

Targeted Ministry Funding $8,000.

*Support Business Education IRP

Strategy

Upgrade Business Education lab operating systems, wiring, and computers.

Funding

Targeted Ministry Funding Computers for Schools $20,000.

Staff Development

In-house training to be provided to staff.

*To provide improved student access to word processing

Strategy

Purchase and additional class set of keyboards

Funding

Targeted Ministry Funding $9,000.

Staff Development

Classroom demonstrations provided library staff and classroom teachers

*To support IRP's requiring integrated media presentations

Strategy

To provide 3 TV/Pentium/Internet capable carts as per prototype in Phase 1

Funding

Targeted Ministry Funding $12,000.

Staff Development

Software previewed and recommended by Vanguard members of staff

Progress

Proposed June 1999

*To support basic maintenance of new systems and use of software

Strategy

Hold basic troubleshooting and maintenance workshops for staff. Hold

software preview sessions for Departments.

Progress

Proposed June 1999

PHASE III 2000 -2002

*Support IRP requirements of Information Technology course

Strategy

Develop two high end classroom labs containing Pentiums, printers and

software to support the IRP.

Funding

Targeted Ministry Funds

Staff Development

In-service as required

Progress

Commence as funding permits 2000

*Improve access to word processing, marks programs, email and Internet as per Phase 2.

Strategy

Continue to place upgraded and networked 486's on each teacher's desk.

Funding

Targeted Ministry Funds Computers for Schools In-school transfer of

 equipment

Staff Development

In-service as required, provided by current staff

Progress

Commence and complete 2000

*To support the IRP's of the Fine Arts Department

Strategy

Develop a video editing and a video projection lab

Funding

Targeted Ministry Funding Career Prep Dept. Funds

Staff Development

In-service to be provided for Fine Arts staff

Progress

Commence in 2000

*To support the IRP's of the Technical Education Department

Strategy

Develop a high end mini lab in the Technical Education Department

Funding

Targeted Ministry Funding Career Prep Dept. Funds

Staff Development

In-service to be provided for Technical Education staff

Progress

 Commence in 2000

*To support communication at all levels in the school

Strategy

Develop an intranet in the school

Funding

Targeted Ministry Funding

Staff Development

Train Technology Resource Teacher

Progress

Commence in 2000