INTEGRATING COMPUTER TECHNOLOGY IN GRADE ONE CLASSROOMS

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DEDICATION

To my wife, Jackie Moorhouse, and my daughter, Andrea Gleason.

ABSTRACT

The purpose of this project was to examine how Grade One teachers in Central

Alberta are integrating computer technology into daily teaching. The literature review

provides a brief history of various technologies that have been introduced to schools

throughout the twentieth century. The review also examines articles that are about the use

of computer technology in primary classrooms.

The interviews with six Grade One teachers included questions about their

computer technology background and training, how they used the technology, their

frustrations and their suggestions for better use of computer technology in the classroom.

Findings reveal that teacher expertise was gained through workshops and personal

use of computer technology. The workshops concentrated on hardware and software

operation rather than effective classroom use of computer technology.

The project conclusion includes recommendations to improve use of computer

technology in the Grade One classroom. A significant aspect of the interviews was that

all the teachers prefaced the interview with an apology regarding their lack of expertise

with computers and software. In order for teachers to approach computer technology in a

confident, constructive and positive manner, there is a need for a long term financial

commitment by Alberta Education.

Another aspect of the conclusion is that computer technology, especially at the

Grade One level, should remain only a small part of a young child's education.

ACKNOWLEDGEMENT

TABLE OF CONTENTS

          Questions 1-3
          1. Give a short history of when you started using computers
          in your classroom.
          2. What background and training do you have in computer use?

LIST OF TABLES

CHAPTER ONE

Introduction

This project examined the use and integration of computer technology in Grade One classrooms in Central Alberta. The focus was how Grade One teachers made use of available computer technology to achieve curriculum goals. Within the context of how Grade One teachers used and integrated computer technology the following were examined: 1) computer background and skills of the teacher, 2) frustrations and problems with the use of computer technology, and 3) similar, different, and novel approaches to computer technology use. An examination of the research regarding the use of computer technology at the Division 1 level and in particular Grade One is included.

Recommendations to improve computer technology integration at the Grade One level concludes this project.

<u>The Question</u>

How are Grade One teachers in Central Alberta using and integrating computer technology in their teaching?

<u>Background to the Project</u>

During the last several decades there has been an explosion of technology that is pervasive in our everyday lives. We have moved from a time when owning a CD player was "high tech" to an age where communication via the Internet has increasing significance for schools, business, industry, and households. This rapid increase challenges schools to keep pace with computer technology in a manner that will be meaningful for students.

A significant aspect of this challenge is the cost of technology. In the twenty years that computer technology has moved ahead with such incredible speed, Alberta schools have been caught in a juxtaposition regarding this progression. Financial resources of most schools are limited. Consequently it is often difficult to give students ready access to computer technology since the cost of approximately $2000.00 per computer unit limits computer purchases by schools. Yet, Alberta Education (1997) states that an overall goal is to prepare students so that they "understand, use and apply technologies in effective, efficient and ethical ways" (p. 2).

Alberta Education's publication of <u>Learner Outcomes in Information and Communication Technology</u> in 1997 gave specific direction to the primary grades with regard to technology. In order to accomplish these learner outcomes, schools will need to look at how technology will be integrated into curriculum. This will involve an examination of the current use of computer technology and what changes will have to be made at the school and classroom level in order to achieve the technology learner outcomes specified by Alberta Education. For many schools it will also mean careful scrutiny of financial resources in order to purchase hardware and software to follow through with the expectations of Alberta Education.

Grade One, therefore, was an interesting grade to examine student computer use. Since Kindergarten is not mandatory in Alberta, Grade One may be the first formal year of education for some students. It is also the year where parents and teachers expect that beginning literacy and mathematical skills will be taught and will be learned by most students. It is a critical year in a child's life and can often have a most profound affect on the academic years to come.

During this first formal year of education, many students have limited literacy and mathematical skills. Integrating computer technology becomes another aspect of this very challenging year. Given the limited skills of these students, especially at the beginning of the year, how can teachers best use the computer hardware and software available to them? Considering the skill level of Grade One students especially in the first half of the school year, using computer technology effectively may be a far greater challenge at this level than at any other grade.

CHAPTER TWO

A Literature Review

The first section of the following literature review will give an overview of various technologies that have been introduced to classrooms. The overview illustrates that technology and education have a long history together and that technology has had a varied educational impact on the classroom.

The second section focuses on articles about Alberta Education's computer literacy initiatives and highlights some of the publications of Alberta Education that have given teachers direction regarding computer literacy skills and the integration of computer technology in schools.

The third aspect of this literature review examines how computer technology can be used to address curriculum requirements in Alberta and focuses on software use and the possible role of the computer in the writing process .

The last section will give the reader information about pedagogical practices regarding technology with emphasis on Early Childhood teachers.

References to computer technology will be a reference to microcomputers unless otherwise specified.

Overview of Technology in Primary Classrooms

Education in the 20th century has been challenged by a parade of "technology gurus" who proclaimed revolution and reform. Often these people were not educators themselves but felt that there was a need to use technology as a vehicle for change. In the early 1900's for example, Thomas Edison talked about reform in education through

technology, in this case reform through the use of the film media. Edison claimed that "books would soon be obsolete in schools. Scholars would be instructed through the eye. It would be possible to touch every branch of human knowledge with the motion picture. The school system would be completely changed in ten years" (Gormly, 1996, p. 266).

Radio, hailed as 'the textbook of air," became the next technological reformer. Although it had had limited success in the realm of distance learning, reasons such as the cost of radio purchase, programming quality, lack of information about broadcast schedules, and poor signal reception contributed to the lack of consistent widespread use of radio in classrooms (Gormly, 1996).

The typewriter was another technological wonder that was predicted to make a huge impact in education. Miller and Olson (1994) cited a 1933 advertisement that stated:

Hundreds of thousands of parents had provided typewriters for the use of their children. Other thousands in months to come would buy machines for their children. These purchases were beyond the control of educational authorities but the effect of this increased use of the typewriter by children would be bound to be felt by schools. (p. 123)

The crushing poverty of the Depression and the subsequent world war may have temporarily halted any focus on educational reform, however, post war years introduced television, as the newest technology of change in education.

Once again the words "reform" and "revolutionize" became synonymous with technology. Gormly (1996) quoted theorist E.B. Kurtz who believed that television would forever change classrooms, "this new instrumentality would become the most potent agency of universal education ever conceived. For, in due time, every home would have

its own classroom, with professor, blackboard, diagrams, pictures and students" (p. 268).

Like its predecessors, television failed to live up to its advance billing. As Gormly (1996) noted, factors such as expense, convenience and the quality of programs were some of the reasons for its limited success even though government agencies throughout North America contributed millions toward educational television programs.

Computer technology differed from past technology ills. It was fast becoming widespread in commerce and industry before its introduction into schools. The microchip dramatically changed machinery not only throughout industry but in our homes. It was felt that nations that knew how to create and use this technology would be the economic leaders of the world (Alberta Education, 1983). According to Alberta Education, being computer literate would be a survival skill required in the very near future. There would be a need for the entire population of Alberta to be computer literate, and unless such literacy was learned from early childhood, a substantial part of the population could find that they lacked the basic skills needed to get along in their daily lives.

In 1981 the Minister of Education announced the formation of a task force to study the use of computers in the schools of Alberta. In 1983, the task force delivered its recommendations to the Minister. Part of the introduction of the report stated that " we were on the verge of technical, economic, and educational change of an order not seen before. The question was not whether we could afford the effort and cost required to introduce computers into our schools. Rather, the question was whether we could afford NOT to do so" (Alberta Education, 1983, p. 3). The task force went on to make thirty-eight recommendations ranging from computer literacy for education faculty undergraduates to computer to student ratios (1 to 8). Issues such as how computers had

an impact on cognitive development, how computers might decrease the departmentalization of subjects, how computers might affect academic achievement and the relationship between age, gender, and computer use were also recommended by the task force for more research.

The task force echoed many sentiments of the time. It was felt that we were on the verge of a technological explosion and that education needed to stay well versed in computer technology. The message of the task force was that schools in Alberta needed to be part of the technological revolution and that this participation would not only have educational benefits but economic benefits as well for the province (Alberta Education, 1983).

The Minister's Task Force on Computers in Schools (1983) may have been influenced by a much more widely publicized document that was having an impact throughout North America. A national commission in the United States had released a report entitled "A Nation At Risk" earlier on in the year that discussed the state of education in United States. There were five major themes the authors believed were essential for consideration by the U.S. government. All but one of the themes related directly to technology. The other four themes were: " a) loss of U.S. preeminence in technology and ability to compete, b) education linked to success in economics and technology, c) computer literacy as critical to education and work in contemporary society, and d) technology and better software critical to instructional delivery" (Gormly, 1996, p. 283). Education and technology, linked with economic success and productive work are also integral components of the Alberta task force report to the Minister of Education (Alberta Education, 1983). Both documents emphasized the need for computer

technology to become an important focus in schools.

Alberta Education Computer Literacy Initiatives

In 1983 the first curriculum guide for computer literacy at the elementary level

was published. But, the 1983 Curriculum Guide for Computer Literacy did not give

Grade One teachers or other grades in the Division I category (Kindergarten to Grade

Three) direction with regard to the integration of computer technology. The curriculum

guide focused on grades Four through Six.

However, indications that Grade One and other primary grades were using school

computer technology were substantiated by a province wide survey conducted two years

later. According to the 1985 provincial computer survey 12.4% of the early childhood

classes and 34.2% of the Grade 1 classes were involved in introducing students to

computers (Alberta Education, 1987, p. 3). This meant that these Grade One classrooms

did not have specific curriculum direction from Alberta Education since the existing

curriculum guide at that time started at the Grade Four level.

In 1987, a discussion/directional paper entitled "Computers in Elementary

Education" was published by Alberta Education. The paper made specific

recommendations for Division 1 students that included "proficiency in the areas of: 1)

Operation- being familiar with how the hardware works, 2) Application- using software

to accomplish a task, and 3) Integration- using the Operation and Application to complete

work, solve problems and process information (p. 8).

However, the recommendations were not implemented into a curriculum guide for

Division 1. It was not until 1997 that specific outcomes were articulated in the "Learner

Outcomes in Information and Communication Technology, ECS to Grade 12", a

framework of outcomes that will serve as an interim guide until formal publication of a

Program of Studies in the year 2000. For Grade One teachers, the "Outcomes" document

provides a scope to work from although it is important to note that specific outcomes are

grouped according to divisions. Division 1 refers to Kindergarten to Grade Three and

therefore the outcomes prescribed are designed as goals to be completed by the end of the

division. There are no specific references to outcomes for a particular grade level.

The publication has three focus areas : 1. *Foundational Operations, Knowledge and Concepts* which includes understanding the nature and impact of technology, safety, basic computer procedures, and telecommunication and multimedia technology operations.

2. *Processes for Productivity* which is a focus on the knowledge and skills required to use a variety of basic productivity techniques and tools. These outcomes would concentrate on text composition, data organization, electronic communication navigation, and multi-media skills such as graphics and audio composition and manipulation.

3. *Inquiry, Decision Making and Problem Solving* outcomes which build on the other two areas. Using the foundational and productivity knowledge and skills, students are taught how to use technology to critically assess information, manage inquiry, solve problems and use research techniques. All three of the above outcome areas are to be used within the context of a subject area and are progressive with simple skills leading to more complex skills.

Integration of these outcomes into the context of the programs of study is one of the underlying principles of the Framework of Learner Outcomes which states that technology is to be integrated primarily as a tool and the content of the technology

learner outcomes are to be taught as a "curriculum within a curriculum" (Alberta Education, 1997 p. 2). These outcomes, although optional at this time will become mandatory by the year 2000, a recognition that all students from the beginning of their schooling need to be involved with technology in a systematic and progressively more sophisticated manner.

The option years of 1998 and 1999 give teachers, schools and school divisions some time to ensure that all teachers have the necessary computer skills to complete the requirements of the Alberta Education Learner Outcomes in Information and Communication Technology. The framework provides an important basis for professional development activities in order for teachers to acquire technology integration skills. "Best Practice" projects are also in development in order to identify good models of implementation and curriculum integration (Alberta Education, 1997).

Grade One teachers in particular have the responsibilities of introducing the initial skills and of teaching the necessary knowledge, skills and attitudes towards technology and learning that will carry on into future grades. In their 1996 position statement about technology, The National Association for the Education of Young Children stated that "as early childhood educators become active participants in a technological world, they need in-depth training and ongoing support to be adequately prepared to make decisions about technology" (Young Children, 1996, p. 15).

Computers and Curriculum--How Computer Technology is Being Used in the Classroom

The cost of hardware and software continues to be a large factor in the integration of technology into schools and classrooms. A particular challenge, especially in the 1980's was to find appropriate software for young children in the world of keyboard

driven hardware technology. At the schools visited for this project the most popular

source of software for Grade One students was from the Minnesota Education Computer

Consortium (MECC). The majority of this software would be classified as Computer

Assisted Instruction, software that concentrates on reinforcing skills in specific subject

areas such as mathematics, language arts, social studies and science.

The use of this type of software has created a great deal of discussion. Haugland

(1997) stated that the different types of software being used in classrooms can provide

vastly different outcomes. According to Haugland, "drill and practice software has

limited educational benefit and could reduce children's creativity" (p. 4). Eisenburg &

Johnson (1995) quote Moursand as saying that "computers are often being used as

expensive flash cards or worksheets and that the productivity side of computer use in the

general content area curriculum is neglected or grossly underdeveloped" (p. 1). Critics

such as Maddux (1991) advocate that there is a lack of quality software and that the

technology is too complex for young children.

In contrast, Rockman (1998) maintains that research indicates that drill and

practice software does work for primary students. Becker (1998) states that "good drill

and practice software can be an effective motivator for young children but only if the

skills have been introduced and taught by a teacher beforehand" (Online). Lemke (1998)

concluded that good software can reinforce, accelerate and enrich basic skills.

Davis and Shade (1994) advocate the use of developmental software over drill

and practice varieties. They define developmental software as "software that is open

ended, where children can play and discover concepts, and cause and effect relationships"

(p. 2). Haugland (1992) cited five different studies showing that "developmental

software can make significant gains in a student's intelligence, nonverbal skills, structural

knowledge, long-term memory, complex manual dexterity, and self esteem" (p. 16).

One of the earliest examples of developmental software are LOGO and EZ

LOGO. Developed by Seymour Papert, the programs are based on a Piaget's theories of

children as an active builders of their own intellectual structures, LOGO is a

constructivist approach to learning through technology. It was designed to provide

children with new possibilities to learn and think (Allocco et al. 1992). Research

regarding the overall benefits of LOGO are mixed. Allocco et al. (1992) concluded that

there were conflicting research findings concerning the effects of LOGO, positive or

otherwise.

LOGO has maintained a high profile in other areas of the world. Its use has been

emphasized by entire school systems in Australia, Brazil, Costa Rica, and the United

Kingdom as well as parts of the United States. (Clements, Nastasi, & Swaminathan,

1993). The 1983 Alberta Curriculum Guide included LOGO as an example of software

designed to "foster the development of computer literate students" (p. 5). Consequently

LOGO and EZ LOGO were used extensively throughout the province, although the

recent Learner Outcomes document does not mention LOGO or EZ LOGO at all.

The number of developmental programs or "microworlds" for young children to

use with computers like the Apple 2E, was extremely limited, but during the 1990's a

more widespread use of Macintosh computers and PC Windows based computers has

allowed for greater flexibility and options for Grade One students. Programs such as Kid

Pix, Kidworks, Clarisworks for Kids and Hyperstudio are just some of the increasing

choices for young children. Although more software is available, a recent study

(Haugland, 1997) indicates that "the most predominant request of Early Childhood teachers regarding software development is that the software industry produce more products that are developmentally appropriate, have educational value, are interactive and are open ended" (p.12).

One of the most obvious uses of microcomputers is for word processing and for young children, this is one of the most challenging activities. With limited literacy skills and limited finger span, keyboarding is an activity generally not recommended until children are in the third grade (Davison & Kochman, 1996). Notwithstanding these physical limitations, identification of letters and numbers, the organization of the keyboard, and learning different functions of specialty keys can be a challenging task for Grade One students. However, Guthrie and Richardson (1995) found that young children are drawn to technology and are intrinsically motivated to use computers. "With or without direct adult assistance, students will find the letters to print out a sentence or story. For many students the uniform production of letters, spacing, and correct horizontal alignment was incentive to write more" (p. 16). Guthrie and Richardson stated in their findings that teachers reported that students wanted to use computers and that the quality of their writing improved. "All agreed [the teachers], however, that because of the ease of revising and editing at the computer and the satisfaction and motivation of publishing their work in a form that looks professional, students were more eager to develop their writing product than if they were only handwriting them" (p. 17).

In a study with regard to narrative writing, Jones and Pellegrini (1996) found that Grade One students using Kidworks 2 were able to insert text, delete text, move the cursor, insert icons, use the voice-feedback to listen to their composition, and print a copy

of their composition. Students could usually complete and print a copy of their writing in a 30-minute session.

Others have found similar results. Children's written work shows an overall improvement in quality and writing skills when using word processing software on a computer. (Cochran-Smith, Kahn, & Paris, 1990, Jones, 1994, Moxley & Warash, 1992).

Word Processing is a significantly different process from paper and pencil writing. It is less private and much more easily revised. Another factor that makes word processing a qualitatively different process is the mechanical aspect of writing. Clements et al., (1993) stated that word processing with the computer encouraged children to write.

Letter formation, "staying on the lines", and neatness are all assured. Easy text entry, simple and quick editing procedures, along with simple spell checks have encouraged writing and experimentation. Perhaps because of this, children using computers regularly write more, have fewer fine motor control problems, worry less about making mistakes, and make fewer mechanical errors (p. 59).

Jones and Pellegrini (1996) attribute the decreased concern about mechanics and ease of text entry to greater focus on metacognitive processes. They found that "compared to Grade One students using paper and pencil, students using a word processor revealed a greater use of metacognitive language such as I *think , know, guess,* and subordinating conjunctions such as *if, although, because* " (p. 695). They concluded that if children were thinking more about the actual language and content there would also be an overall improvement in the quality of writing. Clements et al. (1993), Haugland (1992), and Shade (1996) also refer to greater gains in cognitive skills and better quality writing through word processing and collaborative activities on the

computer.

However there are many factors that may contribute to the quality of young children's written work. Writing and metacognitive activities such as planning and organization are part of the complex activity of writing which is also just part of an intricate web of activities that occur in a classroom. In a very thorough examination of the research on word processing Cochran-Smith, Paris and Kahn (1990) caution that it is difficult to make conclusive generalizations.

If we work from the view that teaching is a highly complex, context - specific activity and that differences across classrooms, schools and school systems are not trivial, then we must also acknowledge that research is probably not going to lead to global generalizations about word processing and writing in elementary schools. How word processing affects children's writing practices is partly a result of the ways these are socially organized. (p.243)

The human factor is still most critical in order for word processing to have constructive value in a classroom. Word processing is most powerful when used specifically as a means to an end. Rockman (1998) emphasized that, without writing instruction, a word processor is not likely to make a significant difference. He stated that a number of studies show that students need feedback.

They might write longer stories with a word processor, and the stories will look better which might result in better grades but the quality improvement will only occur when they receive feedback. Similarly assuming people know how to cooperate and collaborate on a task is wrong. They need to be taught. (Online)

The public nature of the computer screen may lend itself to more collaborative

type activities. The actual process of creating a written story or solving a problem is evident to anyone who can see the screen. Cochran-Smith et al. (1990) point out that in Mathematics or Science, "the public aspect of computer problem solving is critical, that each problem-solving step is available for scrutiny in a way that pencil work scribbled in a corner of a page never is" (p. 242).

Clements (1987) cites six different studies that reported that students benefit from collaboration that occurred when children worked with computers, especially when the computers were within a classroom setting. Students modeling teacher lessons and suggestions helped and taught each other. This is an important aspect of computer use in the classroom. Students are engaged in a number of different activities in the learning environment such as verbalizing ideas, discussing, and interacting with one or more children. This give and take process can be relatively simple or very sophisticated. Clements (1987) states that primary grade students collaborated more when working with the computer than with paper and pencil. The types of interactions ranged from working in parallel, or taking turns to more sophisticated forms of collaborative work, such as helping or instructing, and building upon each others' ideas. Teachers can expect children's interaction styles to change as students gain experience, with progression from turn taking to peer teaching to peer collaboration (p. 60).

Computer technology may be used to address curricular requirements through such methods as computer assisted instruction (CAI) or word processing, however the teaching methods are still most important. As Candelle-Elawar & Wetzel (1995), Haugland (1997), Miller & Olson (1995), and Murphy & Thuente (1995) all maintain, the most essential element for successful implementation of computer technology in the

classroom is the teacher.

Pedagogical Directions with Computer Technology

Early pedagogical approaches tended to treat computer technology as a separate

subject mainly focused in on the mechanical use of a computer. The goal according to

Alberta Education (1983) was computer literacy. Computer literacy is defined as

knowledge of how computers are used in industry, commerce and other areas of everyday

life, how computers are programmed and how to use a computer.

Many Alberta schools arranged computers in a lab setting. A 1993 survey by

Alberta Education indicated that 50 % of the respondents had computers in a lab setting

while 16% of the schools reported that computers were in a regular class setting (p. 11).

Many schools also reported having a "computer coordinator" who maintained the

computer lab and may have been responsible for the planning of lessons (Alberta

Education, 1993). Shade (1996) stated that "computer labs encourage the practice of

making computers a subject in itself, that computers should be in classrooms in order to

allow teachers to use computers as a creative tool across all curriculum areas" (p. 43). In

a study of computer coordinators, Evans-Andris (1995) reported that "teachers,

coordinators, and administrators agreed that computer activities in the computer lab were

unrelated or were, at best, loosely tied to classroom curriculum" (p. 41).

Clements et al. (1993), Haugland (1997) and Shade (1996), state

that the use of computer assisted instruction (CAI) as a teaching method has been

widespread. Shade (1996) cautioned teachers about excessive use of CAI, that students

are being subjected to large dosages of drill and practice and that the computer is rarely

integrated across the curriculum.

Pedagogical approaches need to go beyond CAI and computer literacy. Davidson and Kochman (1996) stated that technology can enhance content delivery by more effectively piquing student interest and that appropriate technology use highly involves and motivates students.

Alberta Education recognizes this need for greater emphasis on varied pedagogical methods and the focus on computer technology as a tool of learning. Part of its mandate is to produce "illustrative examples" which serve as published models for teachers to use and expand upon. The Alberta Education draft, Illustrative Examples with Curriculum Links (1998) provides examples of completing curriculum goals with technology in Grade One subject areas of Science, Language Arts, and Social Studies. The examples are practical suggestions for computer technology use that can be incorporated into daily lesson plans. Each example also has related technology outcomes and other curriculum outcomes stated in order for teachers to integrate computer technology activities into curriculum objectives.

Further addressing the need for computer technology integration is a project that is the collaboration of the six Alberta Regional Professional Development Consortia in conjunction with the College of Alberta School Superintendents (CASS), Alberta Education, The Alberta Teachers' Association, the Council of School Administrators, and the universities of Alberta, Calgary, and Lethbridge. The project focus is on three areas: 1) *Skill-building* - improvement and development of computer skills, 2) *Technology Across the Curriculum* - creation of teaching plans and materials, and the 3) *Technology Mentorship Program* which will allow mentors to create materials for the *Technology Across the Curriculum*. The latter will provide mentors with time to work with a cohort

of teachers to implement technology plans in the classroom (Consortia, 1998, p. 1).

The Chinook's Edge School Division Technology Plan (1997) and the Red Deer Public School Division Technology plan (1996) both acknowledge that professional development is a key component of their respective technology plans. Both also acknowledge that the development of integrated learning environments is to be encouraged.

There is little doubt that there are provincial and district initiatives to encourage the integration of technology at the classroom level. Of critical importance will be the cost of ongoing projects and the time needed for successful pedagogical approaches to be incorporated. As Saul Rockman (1998) stated:

> When it comes to professional development, time is our most valuable commodity. All research says in order to make changes we need time to practice, prepare, and explore. There's a tradition of requiring courses for teachers but not making them important. What is needed is to have colleagues you can learn from or a reason to take the technology home and learn it. (Online)

The literature review provides insight into some of the issues around integrating computer technology into the classroom. Schools have a history of using technology, most often with minimal success. Computer technology is the latest of these technologies and may have the greatest impact on education. Since the early 1980's, Alberta Education has published various documents that attempt to address the impact and use of computer technology in Alberta classrooms. In particular, the <u>Learner Outcomes in Information and Communication Technology</u> publication from Alberta Education indicates that young children need to be using computer technology during daily learning activities. The

significance of this document is that, for the first time, Alberta Education recognizes that it is important that children begin to use computer technology from Kindergarten to Grade Twelve.

Pedagogical directions with computer technology have also begun to evolve from treating computer technology use as a separate subject to integrating computers into daily use. Subsequent chapters of this project provide more information about how six Grade One teachers in Central Alberta integrated computer technology into their teaching.

CHAPTER THREE

Methodology

<u>Introduction</u>

Central Alberta is located between the two major cities of Edmonton and Calgary and is the center of the major population area of the province. The focal point of Central Alberta is the city of Red Deer which is the only urban community in the area. Surrounding Red Deer are a number of smaller communities ranging from small hamlets to large towns that access the city for many goods and services. Therefore, when referring to the teachers of Central Alberta it is important to recognize both rural and urban aspects of the region.

<u>Selection of the School Divisions</u>

Red Deer Public School Division #104 was chosen because it is the largest urban school division in the city. It has approximately 9000 students divided between twelve elementary schools, four middle schools and two high schools (Red Deer Public School Division, 1998, Online).

Chinook's Edge School Division # 73 was chosen because it is one of the divisions adjacent to Red Deer Public. It has over 11000 students with 38 schools in a number of communities in Central Alberta. Communities range in size from small hamlets to larger towns with populations between five and seven thousand people (Chinook's Edge School Division, 1998, Online).

Selection of Schools

Six schools were selected to provide representation of urban and rural settings. Selection of schools was also made with school population size in mind. Ideally, selection would include three urban schools and three rural schools that would also have a varied school population size in each of the urban and rural settings.

As a teacher and a school administrator in the Central Alberta area for the last nineteen years, the writer has a general knowledge of the schools in Chinook's Edge School Division and in Red Deer Public School Division, at least concerning location, school size and grade configuration. Therefore, selection of the schools was not done randomly although there was a real effort to make the selection varied, especially with regard to school size. Principals were contacted by telephone to see if they would agree for a staff member to be part of the project. Since the interview would involve a staff member from their school and the interview questions could reflect on school practices with regard to computer technology, it was important that the school principal be aware of the project. At this point the school administrator could choose to decline to have a staff member be part of the project. Ten schools were contacted. Four principals chose not to be involved, stating that their Grade One teachers had little or no access to computer technology in the school.

Selection of Teachers

Each principal was asked to recommend a Grade One teacher at the school who was interested in computer technology and was trying to use the available computer resources at the school with his or her students. For several reasons, the principal was asked to make a recommendation. Ideally, the principal is aware of what is going on in

each classroom and what interesting projects are taking place in the school. Secondly many teachers are often very modest about their accomplishments. Often it takes encouragement by other staff members or the administration for most teachers to talk about their successes in the classroom. Lastly, it was felt that an advertisement placed in schools may have been perceived as a request to interview teachers who were computer "experts" rather than Grade One generalist teacher.

After the school principal made a recommendation the teacher was then contacted to request involvement in this project. It was emphasized that although there had been a recommendation by the principal, participation was completely up to the teacher. An interview time was arranged with the teachers who did agree to take part in the interview. All teachers who were contacted agreed to be part of the project.

Data Collection

Interviews took place at the interviewee's school, and with one exception, in the teacher's classroom. The classroom setting gave the interviewer additional information about the type of computers being used in the classroom, any additional hardware in use, and how the computers were placed within the classroom setting.

The interview provided an excellent opportunity for detailed answers and the most insight into how Grade One teachers are using computer technology in their respective classrooms. Audio-taped interviews allowed for opportunities to clarify any ambiguities with regard to the questions. The teachers interviewed also were able to answer questions in detail in an informal, conversational atmosphere that may have been less prevalent had I been concentrating on writing responses to each question. As Palys (1992) explained, "in-person interviews are a personal way to gather information and

very effective when the researcher is interested in in-depth responses from a relatively small sample" (p. 166). On the average, interviews were about 30 minutes long.

The interview questions were :

1. Give a short history of when you started using computers with your students.

2. What background and training do you have in computer use?

3. How did you receive this training?

4. Do you use computer technology in the following areas? And if so how?

Language Arts?

Math?

Science?

Social Studies?

Art?

A specific computer time?

Others?

5. Is the computer technology that you use with your class, in a computer lab, in the classroom or perhaps in some other area of the building?

6. Do you use the Internet for professional purposes? Please give some examples.

7. Has the Internet become a tool that your students use in school? If yes, please give some examples of how this tool is used.

8. If possible, provide an example where computer technology may have improved the quality of education in your classroom?

9. Has the use of computer technology changed the style of teaching in your classroom? If so, how?

10. What are some of the frustrations you have encountered with regard to computer technology in your classroom?

11. What could help you be more successful at integrating computer technology in your classroom?

12. If you had unlimited funds, what would your ideal "high tech" primary classroom look like?

<u>Data Analysis</u>

Each audiotape was listened to several times. The points from each response were noted under each question resulting in a written summary for each interview. Some of interview questions were of a "yes or no" nature and therefore could be converted to a chart. Although the chart did not provide detailed answers, it did provide a means to quickly check for trends. Charts were used for the following questions:

Question Two- What background and training do you have in computer use?

Question Four- Do you use computer technology in the following areas? And if so how?

Language Arts?

Math?

Science?

Social Studies?

Art?

A specific computer time?

Others?

Question Five- Is the computer technology that you use with your class, in a computer lab, in the classroom or perhaps in some other area of the building?

Question Six- Do you use the Internet for professional purposes? Please give some examples.

Question Seven- Has the Internet become a tool that you students use in school? If yes, please give some examples of how this tool is used.

Question Nine- Has the use of computer technology changed the style of teaching in your classroom? If so, how?

The following is the chart constructed for Question Nine. Changes in chart structure were made to accommodate the particular aspects of each question.

Has the use of computer technology changed the style of teaching in your classroom?		
Teacher	**Y/N**	**Explanation**
Teacher One	Y	Gives more time for student individual needs.
Teacher Two	Y	Computers very compatible with a project approach.
Teacher Three	Y	More of a facilitator than a "command" or direct teacher.
Teacher Four	N	No further explanation.
Teacher Five	N	No further explanation.
Teacher Six	Y	Would change more if there were computers in the room.

Limitations of the Project

Questions that elicited responses with no evident common themes were noted. However, probing for factors that may have created such a varied response would not be part of the scope of this project.

Since teachers from two different school divisions were interviewed, it is possible there were common responses between teachers from the same division that differed from teachers of the other school division. Differences between the two school divisions were noted without identifying particular practices or approaches to a specific school division. The focus was on individual teachers and how they used the technology resources available to them in their particular school. Specific comparison between the school divisions is not the purpose of this project.

The interviews with the six Grade One teachers were the focus of the project. The data in Chapter Four is arranged according to the order of the interview questions and provides information about computer technology use by Grade One teachers in Central Alberta.

CHAPTER FOUR

The Interviews - Findings

The six teachers interviewed provided a wide range of years of teaching experience. The range was from three to over twenty years of teaching. With the exception of the least experienced teacher all had taught a variety of grades at the elementary level.

The schools also represented a range of size and grade focus. Table 1 provides information on grade configurations, overall and elementary school population and the demographic setting for each school.

Table 1   School Demographics

School #	Grades In School	Overall Population	Elementary Population	Demographic Setting
1	K-3	530	530	Rural
2	K-4	540	540	Rural
3	1-12	256	140	Rural
4	K-6	300	300	Urban
5	K-6	500	500	Urban
6	K-6	400	400	Urban

The school buildings ranged in age from nine years to over twenty five years. It should be noted that the school that was nine years old had expanded twice during that time. The significance of this may be that schools that were relatively new, or had undergone recent expansion may have had less monies available for computer technology as classrooms were supplied with more of the "basic" materials.

<u>Questions 1-3</u>

Give a short history of when you started using computers with students.
What background and training do you have in computer use?
How did you receive this training?

Five out of six teachers started using computers in the early to mid 1980's. Only one teacher could specify a year (1982) which she started using computers. Of these five teachers, all used Apple 2E machines. Four teachers indicated that the computers were placed in a lab setting and that for the majority of the time the computers were used with specific Computer Assisted Instruction software which had been supplied to the school through a licensing agreement with the Minnesota Education Computer Consortium (MECC). There were two exceptions to this general trend.

One teacher had taught in a two room school that housed grades one through six. Computers were in the classrooms and students used the machines throughout the day. There was no formal computer period set aside and the main activity was the use of LOGO and EZ LOGO as part of an emphasis on problem solving activities within the classroom. The teacher indicated that at that time (1985), the school was probably one of the most technology rich schools in the province, boasting a 10:1 student/computer ratio. Alberta Education statistics indicate that the student-computer ratio in 1986 was 20.3:1 (Alberta Education, 1993, p. ii).

The teacher with only three years teaching experience indicated that she started using computers in her first year of teaching. She had use of two Apple 2E's and one Macintosh computer within her classroom. She also had bi-weekly use of the school's "model technology room" that had ten computer sites for students, one teacher

workstation, a digital scanner, and video hook up.

All six of the teachers interviewed had very similar experiences with regard to background and training. Only the teacher with three years teaching experience had taken computer technology courses at university while enrolled in teacher training. She indicated that the computer technology courses were about computer programming and had minimal impact on how she used computers now. The only other course related to computer technology was a "media course" that was a requirement for all education faculty undergraduates. The media course introduced undergraduates to various types of equipment such as video recorders, audio tape machines etc. that teachers might use in a school setting. Two other teachers indicated that they had taken district sponsored courses of six weeks duration on BASIC Programming in the mid to late 1980's. Both indicated that the courses had little impact on their classroom activities during the time they were taking the course and afterwards.

All six teachers had taken workshops and inservices, either sponsored by the school or by the school division. The majority of the courses were of one to three hour duration often taking place during a division professional development day. Although some inservices were taken by all staff members of a school, most were taken by the teachers interviewed because of their interest in computers. None of the teachers interviewed indicated that they had been mandated to take a certain number of computer technology inservices.

Although all six teachers indicated that they had taken inservices on computer technology, one teacher indicated that her main source of computer technology education was mainly through a mentor relationship she had with the teacher who was teaching in

the school's "model technology room." The model technology room had been built by the school district to be a working classroom that was specifically designed to encourage collaborative work among students in a technology rich setting. The teacher interviewed felt that her experiences observing the classroom in action, her use of the room with her own students, and her daily accessibility to the model technology classroom teacher's expertise was far more valuable than most formal inservices being held outside the school.

Three of the six teachers indicated that they communicated frequently with other teachers on staff who were interested in computers, especially if they were having a problem with hardware or software. Of these three teachers, two indicated that the school had a specific day and time allotted where interested teachers would get together to talk about computer technology problems or help each other learn about aspects of software in the school. These sessions were of an informal nature, usually had no set agenda and were held in the schools computer lab. The two teachers indicated that these sessions were valuable and had helped them considerably.

All six teachers expressed their desire to know more about computer technology and that they actively sought out opportunities that would provide them with information or experiences to take back to their classroom. Table 2 summarizes information about questions one, two and three. The table provides a summary of approximately when each teacher began using computers, their background and training with regard to computer technology and how each teacher received this training.

Table 2   Summary of Questions 1-3

Teacher	Approx. start of computer use	Background and Training	How Training Received
Teacher One	1982	No post secondary courses	Workshops/Inservices
Teacher Two	1995	Two university courses in "BASIC" programming	University/workshops/ Mentoring relationship
Teacher Three	1985	No post secondary courses	Workshops/ Inservices
Teacher Four	1984	No post secondary courses	Workshops/ Inservices
Teacher Five	1985	No post secondary courses	Workshops/ Inservices
Teacher Six	1985	No post secondary courses	Workshops/ Inservices

Question 4
Do you use computer technology in the following areas? And if so, how?

Language Arts

All six teachers indicated that they use computer technology as a tool to teach

various aspects of Language Arts. Four out six teachers indicated that they use Computer

Assisted Instruction software (almost entirely from MECC) to reinforce concepts such as

letter recognition, phonics skills, and spelling skills. All teachers indicated that their

students have done some word processing, usually the length of several sentences. The

type of software used for word processing varied. Clarisworks, Clarisworks for Kids,

Kidworks, Wiggle Worm, Storybook Weaver, and Kid Pix 2 were the software

applications mentioned for use in word processing. Three of the six teachers mentioned

Storybook Weaver (MECC) as the main vehicle for student word processing. This

seemed to be more from availability rather than teacher personal choice. Each of these

three teachers stated that the school had a software license for Storybook Weaver and that

this was the application installed on the computers. All of the teachers indicated that students also learned to edit their work when using the word processing programs.

Two of the six teachers focused more on a writing project approach regarding computers and Language Arts. These projects would involve several writing periods during the week with specific editing and publishing days. Examples of these projects are a three to four sentence "autobiography" or a "report" about an animal at the zoo. Animals at the zoo were viewed on a CD called "San Diego Zoo" before each child started to write the report. Assistance to the student was given by a teacher or a parent volunteer so that the student navigated through the CD's zoo exhibits correctly.

Mathematics

All six teachers used the computers available for use in mathematics and all six mentioned use of software "drill" practice. The drill practice was with the available MECC software which was used on Apple 2E's. Since five of six teachers had Apple 2E's in their classroom, this was the main use of these particular computers. Drill practice centered on number recognition, simple estimation, counting skills and simple addition and subtraction skills. Only two teachers reported using the newer Macintosh computers for Math. Another teacher reported using Clarisworks for Kids to teach children how to graph information, and then print the information for presentation to the class.

Science

Use of computer technology as a tool to teach Science was an equal split between the six teachers. Of the three that used computers, all reported that use was minimal or incidental. As in mathematics, one teacher instructed students on how to use Clarisworks for Kids to graph information regarding topics in science. A second teacher used

information on local and provincial weather on the Internet to have the class talk about the daily weather. She also would bookmark specific sites that would give children information on a specific topic being investigated in science. The third used the "San Diego Zoo" CD to have students watch the film clips about the zoo and animals.

None of the three teachers reported using Computer Assisted Instruction (CAI) style software for science instruction or reinforcement of concepts.

Art

Three of the six teachers reported that they use computers during Art. All three reported that use was very limited and more of an incidental nature rather than a subject focus for the class. One teacher used a painting program where students could use the paint program to fill in pictures. The second teacher referred to her use of a software application called WiggleWorks where children can create their own pictures. EZ LOGO was used for art purposes by a third teacher. This was mainly to create a design by constructing geometric shapes of varying sizes.

Social Studies

Two teachers reported that they had specific uses for the computer when involved in Social Studies activities. One class was using the Internet site "Kids Pub" to correspond with students from other countries. The other teacher was using Clarisworks to have each student write about his or her family. In this class, the children were also using the draw program in Clarisworks to draw members of their family.

Two other teachers reported incidental use of the computer in Social Studies. Both referred to information or pictures they may have found on a CD to point out to the

students. The other two teachers stated that they had not used computers at all for Social Studies.

Specific Computer Time

The teachers interviewed were asked if they scheduled specific time within their classrooms for student use or were given scheduled computer lab time by the school. Three of the teachers had two Apple 2E's in the classroom which were used mainly as a center and part of a rotation for children when the class was involved in center activities. The main focus of computer use at this time was using drill and practice software. Two teachers indicated that they also had specific computer time in the school computer lab. One teacher had one 35 minute period per week and the other had two 30 minute periods. Both classes followed similar computer lab routines. Children would work on Macintosh machines and during the year would work on a project that would involve some word processing. One of these teachers reported that none of these projects would be printed as Grade One students were only allowed printing privileges towards the end of the school year. The third teacher stated that although there was a computer lab in the school, priority for use went to Division 2 students and consequently Grade One students did not have scheduled time in the lab.

The other three teachers all had Macintosh computers in their classrooms for student use, ranging from one to three machines. One teacher had two 2E's and a Macintosh. The Macintosh had Internet capacity because the classroom had recently been wired for this purpose. A second teacher had two Macintosh computers and was also connected to the Internet and to a school intranet in order to access printers. The third teacher had three Macintosh computers, five 2E's and a laser printer. It also was hooked

up to the Internet and a school intranet. Of these three teachers only one reported having a specific computer time scheduled outside the classroom to access the model technology classroom in the school. The other two classrooms had an internal type of scheduling so that the computers were being used regularly during the day.

The information about computer use in specific subject areas is summarized in Table 3. Information about computer use for the subject areas of Language Arts, Math, Science, Social Studies and Art are indicated by a yes or no response from each teacher. The use of a specific scheduled computer period is also recorded by a yes or no response.

Table 3

Computer Use in Specific Subject or Time						
Teacher	L. Arts	Math	Science	Soc. St.	Art	Sp. Time
Teacher 1	Yes	Yes	Yes	Yes	Yes	No*
Teacher 2	Yes	Yes-CAI	Yes	Yes	Yes	No
Teacher 3	Yes	Yes	Yes	Yes	No	No*
Teacher 4	Yes	Yes-CAI	No	No	No	Yes- Lab
Teacher 5	Yes	Yes- CAI	No	No	Yes- logo	No
Teacher 6	Yes	Yes-CAI	No	Incidental	Painting Program	Yes- Lab

*Indicates a classroom schedule in place for computer use by students

Question 5

Is the computer technology that you use with your class, in a computer lab, in the classroom, or perhaps in some other area of the building?

All six teachers had some type of computer technology in place in the classroom. Three out of the six were limited to Apple 2E computers. These three schools also had computer labs with approximately 30 Macintosh computers. The labs did not have Internet access although plans for wiring each of these schools was in place and was to occur within the next year (1999-2000). Two of the three teachers did have scheduled access to the computer labs.

The other three classes also had access to Apple 2E computers as well as Macintosh technology. The number of Macintosh's ranged from one to three per class as did the number 2E's. The teacher that did not have 2E's in the class had access to a small 2E lab in the school. Sign up use was informal. All the classrooms of these teachers also were wired for Internet use.

One teacher also had use of a pod of Macintosh computers situated in the library. Out of the six schools, four had large numbers of computers (10 or more) either situated in the library or in a computer lab adjacent to the school library.

One teacher indicated use of computers in another type of setting which was termed a "model technology classroom." Table 4 shows common computer settings and indicates teacher use of these settings.

Table 4

Computer Settings and Use				
	Classroom	**Lab**	**Library**	**Other**
Teacher 1	Yes-Main Use	No	No	No
Teacher 2	Yes	No	No	Model Tech Room
Teacher 3	Yes-Main Use	Yes- 2E Lab	Yes-Mac Pod	No
Teacher 4	Yes-Math CAI	Yes-Scheduled	No	No
Teacher 5	Yes-Math CAI	No	No	No
Teacher 6	Yes-Math CAI	Yes-Scheduled	No	No

Questions 6 & 7

Do you use the Internet for professional purposes? Please give some examples.
Has the Internet become a tool that your students use in school? If yes, please give examples of how this tool is used.

Use of the Internet was not widespread among the teachers interviewed. Only two indicated that they had used the Internet to get information for professional purposes. All indicated interest in learning more on using the Internet but have had limited time to become more proficient. One teacher indicated that she had not been on the Internet at all and did not know how to go about getting online.

Three of the six schools did not have Internet access at the classroom level. These schools did have Internet access either in the computer lab or the library. The only

Internet access was in the administration area. A computer had been set up in this area

for staff to use the E mail system.

One teacher used the Internet daily with her class. Weather reports were retrieved

from the Internet and correspondence with children in other parts of the world was

maintained.

<u>Question 8</u>

If possible provide an example where computer technology may have improved the quality of education in your classroom.

One teacher felt that computer technology had not improved the quality of

education in her classroom. Three teachers commented that educational drill and

practice software allowed students to work at their own speed and that the students got

immediate feedback when using the software. Other comments were :

"It has helped the special needs student in my classroom. For all my students, it has

improved basic skills, is a terrific motivator for kids, and has improved problem solving

skills. Some of the kids are using the word processing in Clarisworks and a couple of

kids are starting to use the spell check aspect of the program and that has really

improved the quality of their written work."

"It's another tool, another way to get across the concept, another means to an end, and

its part of their lives. They might as well get used to it."

"Computers are really motivating for the kids. It gives the child immediate feed back on

a skill that has been already taught ."

<u>Question 9</u>

Has the use of computer technology changed the style of teaching in your classroom? If so, how?

Answers ranged from computers having a tremendous impact to having no impact at all on the style of teaching. There were two teachers who felt that technology had changed their style of teaching to a more facilitative style rather that the direct style that they had used in the past. A third teacher felt that computers in her classroom encouraged more of a project approach to teaching and learning. Of the remaining three teachers, two stated that computer technology in the school had made absolutely no impact on their style of teaching. The last teacher stated that although computers had not changed her style of teaching she felt that this might change if she had more computers in the classroom. Table 5 summarizes teacher responses to Question 9.

Table 5

Has the use of computer technology changed the style of teaching in your classroom?		
Teacher	**Y/N**	**Explanation**
Teacher One	Y	Gives more time for student individual needs.
Teacher Two	Y	Computers very compatible with a project approach.
Teacher Three	Y	More of a facilitator than a "command" or direct teacher.
Teacher Four	N	No further explanation.
Teacher Five	N	No further explanation.
Teacher Six	Y	Would change more if there were computers in the room.

<u>Question 10</u>

What are some of the frustrations you have encountered with regard to computer technology ?

All teachers expressed frustration when machines or software did not function. There was frustration with outdated machines and software. There was also a general acknowledgement that their own lack of technical expertise became a frustration factor and that there were times when children waited a long time for help because the teacher was trying to solve a technical computer problem.

All mentioned that time was a critical and frustrating factor. Learning to use computers and software took a lot of time, especially personal time. Use of computers in the classroom also could be very time consuming because Grade One skills were limited and it took the students a long time to complete even simple projects. Two teachers indicated that if there were more computers in their classroom they would need help because they felt they would not be able to get to all of the students, especially if there were any technical "glitches."

Two teachers voiced concern about computer technology being another add on that needed to be addressed by the classroom teacher. The two teachers who voiced this concern felt that the computers in their classroom were too outdated to do the job and that until there was better equipment it would be very difficult to achieve the goals outlined in the <u>Learner Outcomes in Information and Communication Technology</u> by Alberta Education (1997). Table 6 lists responses to Question 10 along with the number of teachers that stated a particular response.

Table 6

Teacher						What are some of the frustrations you have encountered ?
1	2	3	4	5	6	Explanations
				*		Outdated hardware
				*		Outdated Software
*	*	*	*	*	*	Hardware and Software Breakdowns
	*		*		*	Lack of Technical Expertise
*	*		*	*	*	Lack of Time
				*	*	Another add-on to the curriculum

<u>Question 11</u>
What could help you be more successful at integrating computer technology in your classroom?

Four of the six teachers mentioned time as a critical element to integrating

computer technology. These teachers felt that there needed to be more time for training

and also more time for them to get together with other teachers in order to talk about

successful ways to incorporate computer technology.

Four of the six teachers also mentioned the need for either more updated hardware

or just more computers within a classroom setting. One teacher also stated that there was

a need to have support within the school and that experimentation with computers

should be encouraged more by the administration.

Question 12

If you had unlimited funds, what would your ideal "high tech" primary classroom look like?

All of the teachers focused in on an increase in the amount of technology hardware in the classroom although only one teacher wished for a computer/ student ratio of 1 to 1. While more computers was certainly a desire, the actual increase of computers in the classroom ranged from three to eight machines. Internet accessibility was also a very high priority, with all six teachers either desiring access in the classroom or more access within the classroom. Five of the six teachers wanted printers and scanners in the room. Other requests for hardware included better sound systems, laptop computers for teacher use, television hook up to computers, an overhead that was directly linked to a computer and a "smart board" which is a touch sensitive white board that is linked to a computer.

Five of the six teachers thought that an extensive collection of software within the classroom would be highly desirable. Software would range from skills reinforcement to more sophisticated open ended software such as Wiggleworks and Hyperstudio.

Two of the six teachers also asked for a technical assistant in their "wish list." The teachers stated that the technical assistant would be able load computers and help students get to particular parts of software. The aide would also help students navigate the Internet and would also be able to troubleshoot when there were technical difficulties.

Only one of the six teachers stated that other than a couple more computers and a collection of software, she was satisfied with the amount of technology that was

available to her at this time and that she felt comfortable with using the hardware in the school.

CHAPTER FIVE

Discussion of Findings

The first three questions of the interview dealt with background and training. The six teachers interviewed indicated very similar backgrounds with regard to computer use. Five out of the six teachers had been teaching in the early 1980's and all these five indicated that their involvement began with Apple 2E's and MECC software. There was also a common thread concerning acquisition of computer skills since all six teachers indicated that they had gained most of their computer knowledge through informal means. All had attended school or school division workshops that focussed on learning how to use a particular type of software or how to get on the Internet. All mentioned that they access help from colleagues on staff in order to solve technology problems. None of the teachers interviewed had a technology background and, therefore, all expressed frustration when they had to deal with the technical breakdowns.

One teacher referred to a mentor relationship that was her main vehicle of attaining computer literacy skills and also her way of finding out how to integrate technology into daily classroom practices. The mentor relationship also provided use of a "model technology classroom" on a regular basis. According to this teacher the mentorship was certainly not formalized but developed because of her interest in technology and the close proximity of her classroom to the model technology classroom. She indicated that she did not attend very many workshops simply because the mentor relationship effectively provided her with information and modeled practices when she needed it.

The process of mentoring is a vehicle that is receiving a great deal of attention in Alberta Education. The six Alberta Regional Professional Consortia (1998) have developed a program called *Teaching and Learning with Technology*. The aim of the program is to be able to provide teachers with opportunities to learn how to skillfully incorporate technology into daily activities in the classroom. The *Teaching and Learning with Technology* program is in its first year of implementation and therefore it is difficult to assess its impact on teachers and in particular for Grade One teachers.

None of the teachers interviewed had a consistent approach to attaining skills nor have they had any external long range training programs suggested to them by their respective school division. A very evident commonality is that because there was no overall training program, each teacher accessed training when workshops were available even when the workshops would not directly impact what was going on in their classrooms. An example of this is attending Internet workshops even though there was no Internet accessibility in a computer lab or in the classroom.

All six teachers used some kind of drill and practice software, whether in a lab setting or in the classroom to reinforce skills. The most prevalent use was in the mathematics area to reinforce basic concepts such as number recognition, number sequence and place value. All of the teachers made use of the Apple 2E's for this particular reason. The importance of available software became very evident. The MECC software was used almost exclusively. Because the Minnesota Education Computer Consortium licensing agreement was very economical, MECC became the main source of software for schools. It is interesting to note that all the software listed

by the teachers was at least ten years old, and therefore outdated, compared to the software available now.

Regardless of whether a teacher had access to Macintosh computers in the classroom or in a lab setting there was very little use of these computers for drill and practice Math activities. This was not because there had been a deliberate decision to avoid drill and practice but rather because there was a lack of available drill and practice software for use. Schools did not seem to have access to a relatively inexpensive method of obtaining software for the Macintosh computers and consequently these computers were rarely used for Math activities. The only exception was one teacher who was using the "drawing" section of the Clarisworks program to have the children graph information. So even though a teacher might have access to a whole lab of relatively up–to-date Macintosh hardware, math lessons or activities on the computers were very few. In five out six classrooms, math instruction using computer technology seemed to be limited to drill and practice activities on 2E computers, and did not extend to data collection, problem solving or other meaningful math experiences.

Language Arts activities were more varied among the six teachers and also seemed much more dependent on the setting of the computers. Teachers with computers in the classroom were more involved in writing activities than teachers who accessed Macintosh computers only through a lab setting. Even though writing activities were more limited when the Macintosh computers were in a lab setting, all of the six Grade One teachers used the computers to introduce children to word processing through a short writing activity. The teachers who accessed the Macintosh computers in a lab setting indicated that writing activities took place in the second half of the Grade One

year, a logical plan considering the limited literacy and writing skills of Grade One students at the beginning of the year and the limited time each teacher had in the computer lab.

One teacher, who indicated that she started word processing and writing early in the year, used a comprehensive software program called "Wiggleworks." The program is designed specifically for primary grades and includes an integrated approach using writing, graphics, audiocassettes, and a library of books. The teacher had been using this approach to Language Arts for several years and indicated that she was very committed to using it and was very pleased with the results. She also indicated that in order for the program to be successful her students needed to be using the computer daily. She had a routine in place that ensured that all students did use the computer to access "Wiggleworks" during the day. This meant that students had to leave whatever they were doing at their desks in order to have a turn using the computer. However she felt that this was necessary and did not negatively effect classroom activities.

Three of the six classrooms only had 2E type computers in the classrooms. These three teachers all indicated that the only Language Arts activities that took place on these computers were of skill and drill practice that focused mainly on letter recognition. Writing activities were limited to computer lab classes that were scheduled weekly.

Teachers who had Macintosh type computers in the classrooms had children engaged in more writing activities. Activities were also more varied. One teacher had children do some basic research at bookmarked sites on the Web. All teachers used these computers in the classrooms for writing, editing and publishing purposes. All used "story CD's" that provided an audio and visual telling of a story. CD's such as "San

Diego Zoo" were used to help the children find out about favorite animals. Compact

Disc programs were also used for skill and drill. Teachers indicated that the CD

programs were much more interactive and sophisticated and that children were eager to

use the software. These three teachers also stated that students were able to draw

pictures and then write a sentence or two about the picture with software such as

Clarisworks and Kid Pix. The teachers with the Macintosh computers in the room

reported more and varied Language Arts activities than the teachers who had access to

this type of hardware only through a computer lab setting.

All six teachers reported a minimal use of the computer for subject areas such a

Social Studies, Science, and Art. The teachers with the 2E computers in the classroom

reported no use of the computer for Social Studies and Science and only one teacher

who had 2E's indicated that some drawing was done through EZ LOGO activities. All

of the teachers indicated that they would use the computers more if they had the

appropriate software to use.

With the exception of one teacher, it would seem that the use of computers in

these particular classrooms in specific subject areas is, for the most part, incidental.

Even the teacher who had continuous use of computers in her classroom was

concentrating the use in the area of Language Arts rather than in wider use across the

range of subjects.

The most striking difference had to do with the location of the most modern

computer hardware within the school. Three of the six schools had the Macintosh

computers in a computer lab setting. Two of the schools had the most up to date

hardware dispersed among classrooms. One school had a combination of a school lab, a

"model technology classroom", and some newer hardware in each classroom. The three classrooms that had access to new technology (Macintosh) only through a lab setting concentrated mainly on "plug in" types of activities of a skill and practice nature. Given that these classrooms would have two forty minute periods at the most during the week in the lab, it is perhaps not surprising these were the activities that the students were involved in. These teachers did involve students in writing activities but only during the latter part of the year. One of the teachers using a lab reported that her class only printed one writing piece throughout the year because of the limited printing capacity within the lab. (The computers were not networked and therefore stories had to be copied on disk and then printed from a single computer.)

The two teachers who had more up-to-date hardware situated in the classroom also had printer accessibility either directly in the classroom or via a network to a printer situated elsewhere in the school. These teachers reported a more varied use of the computers, ranging from word processing, using graphics with word processing, drill and practice, using CD sources for information, and in one classroom, using selected Internet sites for information sources. In this classroom, students were more likely to be involved in activities that included writing, graphing, drawing, and using electronic sources to learn about animals, plants and other areas of science. Computers were being used more as a sophisticated tool rather than treated as a separate subject or entity. As Davis and Shade (1994) state "one of the most valuable aspects of the computer is its ability to cut across traditional subject boundaries as a practical and useful tool" (p.1). These two classrooms with up to date hardware did demonstrate a good use of

computers to incorporate language arts skills and math skills into other subject areas such as Science.

The teacher using the "model technology classroom" periodically through the week represents the middle of the spectrum of computer technology integration in this small range of six teachers. The technology classroom, with its cluster of two computers for every four or five children, was used for projects that were essentially Language Arts based but also covered subject areas that were of a Science or Social Studies nature. (Animals, All about Me, etc.)

With the exception of one classroom the Internet really has not become a tool that has much impact in these Grade One classrooms. Since half of the teachers do not have Internet access in the classroom and very limited access in the computer lab, this is hardly surprising. It is most logical to take a look at the three teachers who do have Internet access in the classroom. Of those three, only one uses the Internet with her students. Although the other two teachers have expressed interest in using the Internet, they have not done so because they do not have enough expertise to do so. Lack of time is very much a factor. Time is needed to learn about the Internet and then to learn how to use the "net" within a classroom setting. All of the teachers expressed the need for more time to learn about the Internet.

With the exception of one teacher, there was agreement that computers had improved the quality of education in the classroom. Teachers talked about the need for students to get used to a technology that was so rapidly becoming prevalent in our society. Teachers recognize the immediate feedback that children get from computers in drill and practice activities. They also mentioned how it helped reinforce skills

especially for academically challenged students. This coincides with the findings of Niemiec and Walberg (1985) who found that lower achievers profit more from Computer Assisted Instruction and that CAI is more effective in primary grades. Several teachers also mentioned that students are attracted to the computers and want to use the machines.

The effect of computer technology on teaching style seemed to be directly related to the setting of technology within a school and the age of the hardware within the classroom. Three teachers stated that computer technology had no real impact on their teaching style. All three of these teachers had two 2E computers within the classroom with the only access to the more modern Macintosh computers being in a lab setting. The other three teachers who had more up to date computers in the class commented that technology had made an impact. All three talked about a less direct approach to aspects of their teaching with recognition that there was a time and a place for both a direct teaching and a facilitative method of teaching. Although the computers had made an impact, the teachers did not seem to be focusing on the computer. Rather, it was a means to try other approaches or activities that were teacher designed. Miller and Olson (1994) emphasize a holistic approach to computer technology in the classroom.

Computers should not be attributed revolutionary effects but rather we should try to understand the traditional curriculum and pedagogy of teachers. Teachers whose enterprise is enhanced and extended by computers may be better equipped to deal with the problems associated with using computers than those who make quantum moves without the anchor of past practice and a firm grasp of what they are about. Artificial intelligence, expert systems, virtual reality and hypermedia

are new technological areas and the object of interest of futurists; however, those educators who make the best use of these advancements may be those who look backward- or at least look around- (sic) before leaping ahead. (p.138)

Having several up to date computers in the classroom has at least created an atmosphere of experimentation for the three teachers who, although they may not have had the luxury of a computer for each student, did have the opportunity to use the computers during the entire day, even if it meant that two or three students were working with the machine at the same time.

The issue of time or lack of it is a common thread that was mentioned by all teachers interviewed, especially when talking about the frustrations of using computer technology. Time was needed to learn about hardware and software. Time was needed to learn about Alberta Education and school division expectations regarding computers and finally time was often wasted as teachers dealt with breakdowns of machinery. The reality that these teachers were often trying to fix computer operational problems, or even trying to solve actual mechanical breakdowns was a universal frustration factor. Conversations about this time frustration often had an element of resentment as computer technology was viewed as another add on to an already demanding curriculum by at least three of the teachers interviewed. Gilmore (1995) emphasized the need for professional development regarding computer technology integration and stated that one of the most important factors for the successful integration of computers into schools is the building of a body of teachers who are skilled, competent, confident, and innovative in the educational use of computers.

One of the last questions of the interview asked what could help make teachers more successful at integrating computer technology? Once again the aspect of time to train, to research, and to talk to colleagues was prevalent.

The final question of the interview was of a hypothetical nature. Teachers were asked what their "dream tech" classroom would look like. All focused on hardware acquisition, but there was also an emphasis on software. This indicates that there is a very real need for good software to be available to teachers. Regarding hardware acquisition, the primary concern was for more computers, although only one teacher expressed a desire to have one computer for every child. Although there certainly was a "shopping list" enthusiasm for naming different items such as scanners and digital cameras, there were at least two teachers who then wondered aloud about how they could possibly store all this equipment in their classroom. Although the response is as hypothetical as the question, it does point out that even if there were unlimited funds hardware selection will still be limited by space and therefore should be chosen with great care.

The information gathered from the interviews indicates that although computer technology has been in elementary schools for many years, there is still a great deal that needs to be done before computer technology is a viable and effective tool in Grade One classrooms.

Teacher training, in order to integrate computer technology into classrooms, will need a great deal of attention. Teachers are still relying on "one shot " workshops in order to gain computer technology expertise. Often the workshops concentrate on how to run

software or hardware rather than focusing on pedagogical methodology to use in the classroom.

Workshops or inservices were also incidental in nature; that is, teachers took the courses when available. There was little evidence that the teachers were involved in long term professional development to help them use computer technology in their everyday teaching.

The most positive report on learning how to use computer technology in the classroom came from the teacher that experienced a mentor relationship with another staff member. This was an informal mentorship that grew from common interests in teaching techniques and in computer technology. The teacher reported that she often talked to her mentor regarding specifics about software and they often shared ideas about how to use the computer technology for projects in various subject areas. Although both teachers in the mentorship did not teach Grade One, both taught in Division One and therefore had very many things in common with respect to teaching. At the time of the interview the mentorship had been active for approximately two years, providing a sustained period for the inexperienced teacher to acquire knowledge about computer technology from the mentor.

The mentorship concept has a great deal of potential to be a powerful vehicle for teachers to learn how to integrate computer technology effectively into their teaching. It can provide one to one or even small group interaction where ideas are shared, implemented in the classroom and reviewed by the teachers involved. However, a mentorship program requires a long term commitment of at least a year and ideally some

release time from the classroom so that teachers may be able to write lesson plans or plan projects that use computer technology.

The teacher interviews also revealed that teachers who use computers almost exclusively in their classrooms have been "experimenting" more with computer use in various subject areas. Although all of the teachers reported using computer technology in the subject areas of Math and Language Arts, those teachers who had the computers in their classrooms also reported greater student use of the machines in the subject areas of Social Studies, Science and Art. Therefore, if it is a goal of Alberta Education to have computer technology integrated into classrooms it would be logical that a "pod" of computers be placed in each classroom for daily student use.

It is also interesting to note that the teachers that did have up to date computer technology in their rooms also reported that their teaching styles had changed to a more facilitative style. The teachers who relied completely on computer labs felt that their teaching styles had not changed significantly.

Teachers also indicated a great deal of frustration regarding computer technology. They were frustrated with outdated hardware and software, with the lack of hardware and software for classroom use and, primarily, with the lack of time to learn how to use computer technology effectively. The issue of time is certainly one that needs to be addressed. Along with the challenge of integrating computer technology into the classroom, teachers also felt that they needed to be computer technicians in order to keep hardware functioning. The role of a technician was not a welcome one, but often necessary because there was not a technician available in the school. Time was needed to look at software, to learn to use the Internet, to work with students who were trying

something new on the computer, and to work with colleagues who are also trying to use computer technology in the classroom.

Although computer technology has the potential to be an extremely effective tool in the classroom, the interviews with these six Grade One teachers demonstrate that there is a need for reflection on present practices and careful planning for future integration at the Grade One level. If computer technology is to be used successfully in Grade One classrooms, we must learn from past experiences with technologies such as radio and television. It is important to listen carefully to what Grade One teachers are saying in order to address the frustrations associated with computer technology and to try to create an environment that encourages computer use in the classroom.

CHAPTER SIX

Recommendations

Based on the interviews and the literature review conducted in this project, the following recommendations to improve computer technology at the Grade One level are suggested:

Recommendation #1

Schools and school divisions should make greater use of the Professional Development Consortia in order to focus on teaching methods to integrate computer technology in classrooms.

All six teachers interviewed shared a very similar background with regard to computer training. Much of their training had been of their own initiative and the training had been overwhelmingly directed at learning the mechanics of running a particular software program or learning aspects of the Internet. None of the teachers talked about a course involving the pedagogy of actually integrating computers into a primary classroom. None of the teachers had been involved in any long term initiative by their respective school divisions or by their schools to learn about using computers effectively in the classroom. This would indicate that there is a need for more inservice or long term training in the area of learning how to actually integrate computers effectively at the Grade One level.

The six regional Professional Development Consortia's initiative, "Teaching and Learning with Technology", is a welcome move to help teachers develop the skills and knowledge necessary to use technology effectively. The Professional Development Consortia need support from school divisions and schools to continue the work of providing professional development opportunities for teachers. The consortia is an

organization that should provide a coordinated approach to professional development for teachers throughout the province. It has a provincial advisory committee with consortia representatives from the six regions of the province, from the College of Alberta School Superintendents, Alberta Education, The Alberta Teachers' Association, the Council of School Administrators and the universities of Alberta, Calgary, and Lethbridge. This advisory committee can provide a consistent approach to professional development for teachers in Alberta.

A long term financial commitment from the government of Alberta, and also from school divisions is necessary for the Consortia to develop meaningful professional development opportunities for teachers. In the Consortia publication "Teaching and Learning with Technology" (1998), the writers refer to a professional development sequence of entry level, early adoption, mature adoption and innovation. The publication provided examples of activities for each stage of this professional development sequence.

> Time is required for teachers to become skilled and knowledgeable users of educational technology. Research shows that it can take between 3-7 years to progress from the entry–level phase to the mature adoption phase. Teachers need different kinds of support at different phases in the adoption model. For example, as teachers evolve along the continuum, they become more independent learners. At the entry level, hands-on workshops and individual tutoring are appropriate strategies. As they begin to use technology in teaching and learning, professional development may take the form of inservice sessions, peer coaching, visiting

other classrooms, conducting classroom action research, and networking with other teachers. (Consortia, 1998, p. 5)

Professional development costs through the Consortia could be included in the budgets of school divisions and schools. This would recognize the need for teachers to be given long term opportunities to progress from the entry phase to the mature adoption phase regarding their use of technology in the classroom.

Recommendation # 2

Each Grade One classroom should have enough computer hardware to sustain a student /computer ratio of 8:1.

Of the teachers interviewed, those who had computers in the classroom had students involved in a variety of activities on the computer. The teachers indicated that they were trying a number of different activities ranging from graphing, drawing, writing and even limited use of the Internet. In short, there seemed to be greater experimentation by the teachers who had computers in their classrooms. It must also be emphasized that these computers were relatively modern—that there was CD capacity and Internet access.

Since one of the goals stated in the Learner Outcomes in Information and Communication Technology document was that the outcomes were a "curriculum within a curriculum" then it is logical to assume that the most optimal setting for computer technology would be the classroom. A computer lab invites the treatment of computer technology as a separate subject rather than a tool to use while completing other curricular goals. Grade One teachers would have a much greater chance of incorporating technology curriculum goals with computers placed in the classroom.

Recommendation # 3

    Software selection should be the mandate of the teacher, should be closely correlated with curriculum goals and should be facilitated by Alberta Education.

Along with hardware, software is another critical issue for all the six teachers interviewed. There was a very limited supply of quality software for teachers and students to use. However it is just not a matter of obtaining software, it is extremely important that it is software that "does the job" and that it is good. Teachers admitted that they didn't know what "was out there" for use in the classroom. This is not a unique problem. Clements (1987) stated that:

> Computer technology use in the classroom depends critically on quality of the
>
> software, the amount of time it is used, and the way it is used. Research needs to
>
> evolve beyond simply assessing, for example, the effects of computers on social
>
> behaviors. We need guidance on effective computer programs and effective ways
>
> to use them. (p.42)

Obtaining the right software should not be the job of some outside expert but rather the decision of the classroom teacher. In the 1996 position statement of the National Association for the Education of Young Children (NAEYC) the first principle of the position statement emphasizes the teacher as the decision maker regarding the use of software in his or her classroom. "Teachers must take time to evaluate and choose software in light of principles of development and learning and must carefully observe children using the software to identify both opportunities and problems and make appropriate adaptations" (Young Children, 1996, p.12).

Alberta Education should play a greater role regarding software use in the classroom. Currently there are recommendations for software, but this could be further

expanded to assist classroom teachers. Development of "demonstration software" that would allow teachers to look at software without purchasing would be of great benefit to schools. Alberta Education must encourage software companies to manufacture demonstration software and then set up a directory of software titles complete with Internet links on the Learning Resources Distribution Center website. Teachers could then access the Alberta Education website and link directly to the manufacturer. Manufacturers could download demonstration products directly to the school for teachers to try out in the classroom. Alberta Education must lead the way effectively as a coordinator between software manufacturers and the schools in the province.

Recommendation # 4

Each school needs to have technical support available on site.

A major frustration issue with the teachers interviewed was dealing with machinery that was not functioning properly. The teachers do not have the technical expertise to fix the computers nor do they feel that this was an area that they should be dealing with. Each school needs to have a support staff member who is trained to set up computers and other hardware such as printers. This staff member would be able to network computers to printers and also carry out basic troubleshooting and repair procedures. These staff members would likely have other duties in the school unless the size of the school was large enough to sustain a full time technical support staff member. Ideally, the school division would have periodic technical workshops so the technical support staff throughout the division would be constantly updated and trained.

Recommendation #5

There must be long term, consistent funding from Alberta Education in order for schools to acquire and update hardware, acquire software, for technical support, and for

professional development in the area of computer technology integration into the classroom.

Alberta Education has recognized the importance of technology through various publications from the early 1980's up to the current publication of an <u>Interim Technology Program of Studies in June of 1998</u>. Alberta schools have also received financing for the acquisition of hardware at various times during the 1980's and 1990's .

In the mid 1980's school districts received funding for the purchase of computers. For many schools this funding gave schools their first microcomputers in the building. It was not until the mid 1990's that Alberta Education provided all schools with funds designated for upgrading technology specifically to address the need of accessing the Internet. This "Network Access Grant" was five million dollars. In 1996/97 school divisions were informed that 45 million dollars would be funded to schools on a matching basis for the purposes of technology integration. This was further increased by another 20 million dollars to be accessed by school divisions until March 31, 2000. (Alberta Education, 1997)

The funding for technology in recent years is a very real necessity if technology is to be integrated into classrooms. It is essential that the Government of Alberta not stop the funding in the year 2000 but rather make a long term commitment to further funding regarding technology integration. This will allow schools and school divisions to give teachers quality professional development opportunities such as the mentoring program. Continued funding would help develop technical support infrastructures in schools as well as to keep computer hardware updated. If technology integration is an important mandate of Alberta Education it must be sustained financially by the Government of Alberta.

CHAPTER SEVEN

Conclusion

One of the most interesting aspects of the interviews was the actual process of obtaining the interview. Ten schools were contacted. Four schools declined involvement stating reasons such as, "We don't have any Grade One teachers using technology that much." or "Our school doesn't have a lot of computers." The six teachers who did agree to be interviewed all prefaced the interview with an apology, that they really weren't doing all that much with computer technology. Perhaps the school refusals and the apologies indicate that teachers are intensely uneasy talking about computer integration into the classroom. Since the 1980's teachers have heard the rhetoric of the media, the government, and school officials about how computers will revolutionize education. Both Alberta Education curriculum framework documents use phrases such as ". . . fundamentally change the world we live in" (1983, p. 2), "This transformation is creating the greatest occupational upheaval in history" (1983, p.2) , "Technology is causing schooling to undergo phenomenal changes" (1997, p.1), and "The prominent role of technology in our lives today is also changing curricula, that is, *what* students learn" (1997 p. 1). Such generalities have created a great deal of pressure for teachers to use technology as an agent of change within the classroom. There is an inherent message that there is a need to change, that perhaps existing practices within the classroom are no longer good enough.

Past attempts at introducing technologies to education should have helped us identify some recurring problems. The high cost of supplying the technology to each classroom and the subsequent costs of maintenance was a problem. The need to create an

infrastructure of materials and training to go with the particular technology also posed a problem. Finally and most importantly, there was the persistent tendency to overestimate the impact of technology on education and consequently to underestimate or downplay the role of the teacher.

Schools are essentially organizations that rely on a series of interactions between people to achieve academic and social goals. Students learn to work and play together, as well as achieve success in academics. To assume that a machine is going to change that very essence of human interaction is an affront to education. Machines can't make decisions about changes in social organizations, only the people within that organization can initiate change and reform. Technology then can only be used to enhance or accelerate change.

The teachers interviewed all seem to be using the computer technology available as best as they can given the time constraints and training they have received. They all have a healthy respect for the need to teach students the basics of literacy and mathematics among the other things so important at the Grade One level. Consequently, computer technology is not the most prevalent tool in use to teach concepts. After over a decade of having computers in schools, use by Grade One classrooms teachers interviewed is still, for the most part, incidental in the whole picture of everyday activities that take place in their classrooms. Discussion about the use of computers in the classroom should not be prefaced by an apology, but, rather, by an assertive statement recognizing the limits of computer technology and the importance of the most vital task of teaching introductory skills in literacy and mathematics.

Our quest for excellent education should include technology but should not be about computer technology. Statements about the use of computer technology in classrooms should not be termed as a revolution in education but as part of the evolution of education in the last part of the twentieth century. Education will evolve in a positive manner if we focus on the extremely important human interactions that are part of good teaching and good learning activities. It is only when we consider all the elements of quality education in the very social organization that we call school that we can effectively use the computer technology available to us.

Miller and Olson (1995) succinctly put technology in perspective during one of their early studies with elementary teachers.

> The first question a Grade One teacher asked was, "If I have all these computers in my room where am I going to put my plants?" A laugh and wave of the hand by the computer specialist spoke to the value of her inquiry. At the time, we chuckled along with the rest. If we were back in that setting today, we would demand an answer. (p. 77)

Grade One teachers need to be confident that there is a long term commitment by Alberta Education to provide current computer technology in the classroom. Most importantly there must be a commitment to provide long term professional development so that these teachers develop a greater expertise in teaching methods that incorporate computer technology. Only when teachers have the confidence and expertise will innovative teaching with computer technology occur. Perhaps then the Grade One teacher, as the expert, will be able decide how computer technology and the plants in the classroom will coexist. The use of computer technology in Grade One classrooms must

not displace other valuable practices but must be a tool used to provide a richer learning

environment for the teacher and the students.

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