THE IMPLEMENTATION OF A HUMANITIES COMPUTER LABORATORY

by

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ABSTRACT

The last 10 years have seen an explosion in the number of microcomputers available for use in the educational system. However, teachers have little experience in using microcomputers in the classroom and teachers' perceptions of this innovation have seldom been taken into account when implementing computers into the classroom.

This case study was undertaken to delineate teachers' perceptions of computers during the implementation of a 14 computer English/Social Studies computer lab being installed as a teaching tool. Twelve teachers were interviewed during June 1985, just before the implementation of the lab, and again in June 1986, one year after the lab's implementation. The interviews were analysed to determine whether past experience influenced teachers' present perceptions of the usefulness of the new computer lab.

The study found that Naive Users, or teachers with little or no experience with computers made more use of the computer lab as an aid in teaching the writing process than did Experienced Users who confined themselves to having students use the computer as an electronic typewriter. The study also found that the presence of an Aide to help students with the technical aspects of word processing freed the teachers to use the lab as a writing tool without necessarily becoming technically proficient with the computer themselves.

As computers become more common in the school system, it becomes important that teachers recognize and understand that these new tools are useful in helping
to teach students to write. Otherwise computers may largely become a subject of study rather than a tool suitable for student use in many curricular areas.
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1. THE PROBLEM

1.1. INTRODUCTION TO THE PROBLEM

Few of today's teachers are computer literate (Molnar, 1981). In Canada, for example, Rich (1983) notes that, "all provinces have identified the lack of training of teachers in the use of computers in education as being a major issue" (p. 171). Yet, it is today's teachers who are expected to implement computer use in the classrooms.

Classroom computer use is becoming increasingly common (Boyer, 1983); so, research data detailing the ways in which teachers view this technology, as it affects both themselves and their students, are thought by many educators to have increasing importance in the planning of computer implementation by schools (Reif, 1983). When teachers' perceptions of computer technology are addressed by educational computer implementers, the possibilities are improved for these teachers' successful computer use (Hall, 1981). Little research has been done in the assessing of teachers' perceptions of computer technology, particularly in situations where new computer implementations directly affect teaching environments.

1.2. STATEMENT OF THE PROBLEM

The problem in this study was to delineate the perceptions of one such group of teachers affected by the implementation of a computer laboratory, in a particular
school in northern British Columbia. This computer laboratory was established to assist in the teaching of both the B.C. English and Social Studies curricula, with the initial focus of the computer laboratory being on word processing. More specifically this study addressed teachers’ perceptions of computers during the implementation as follows:

1. The ways in which these teachers perceived microcomputers to affect themselves and their jobs, before the implementation of the computer lab, specifically with respect to the following factors:
   a. Do these teachers feel computers may be important to students?
   b. What factors might affect computer use in classes?
      1) How do these teachers anticipate the use of the computer lab with their classes?
   c. To whom will teachers turn for help when implementing computers into their classrooms?

2. The ways in which these teachers perceive microcomputers to affect themselves and their jobs, one school year after the implementation of the computer lab, investigating the same areas of concern as outlined in #1, above.

Inherent in the problem was the choice of the most appropriate interview methodology to use with individuals involved in the lab’s implementation. A semi-structured interview style was chosen to report perceptions of the school’s English and Social Studies teachers, and other school and district personnel concerned with the lab’s implementation. The first set of interviews took place in June 1985 before the introduction of the lab.

In reporting these interview results, the author articulated the set of perceptions
about the potential use of the microcomputer laboratory held by these English and Social Studies teachers. The author then re-interviewed most teachers one year later to determine whether there were any changes in their perceptions during the course of the school year.

This study examined teachers' perceptions of computer technology in this particular case. The case was a senior secondary school in British Columbia which was in the process of developing an English/Social Studies computer laboratory. The development of this computer laboratory was thought likely to create pressure on the teachers involved to use the laboratory in their teaching, and many of the teachers concerned had had little experience with computer technology.

1.3. BACKGROUND OF THE PROBLEM

1.3.1. Social Context of the Problem

The impact of computerized communication on society has occurred in the space of 30 to 40 years, as compared to the 400 years taken by the printing press, in reaching its present prominence as a technological tool (Ahl, 1977). In contemporary society, computer technology is found in such environments as businesses, homes, and schools. In these environments, microcomputers, or personal computers are the most common hardware used, as they are much cheaper than the mainframes first introduced into the public market in the 1950's.
Microcomputers, in the 10 years that they have been available, have begun changing the way people think about computers (Papert, 1980). In his book, *Mindstorms*, Papert (1980), credits the microcomputer with allowing computers to, "exist as objects people see, and start to accept, as part of the reality of everyday life" (p. 181).

When the computer appeared in 1950, 17% of the North American population was engaged in information related jobs. These jobs included lawyers, managers, secretaries, clerks, stock brokers, and teachers. Today, at least 60% of jobs involve information processing (Moynes, 1984). This trend is likely to continue, as contemporary information jobs increasingly involve computer use. This trend puts pressure on teachers to familiarize themselves with computers and to expose their students to computers as well.

As society continues, then, to increase its use of computer technology, the employment market will need people capable of handling the new technology. *Time* magazine (McGrath, 1982) was prompted to comment that, "the U.S. is rapidly becoming a high tech society with a low tech education" (p. 60). To avoid continuing this circumstance, the school system will need to make students computer literate. If students are to become computer literate in the educational system, then it follows that teachers must also become computer literate.
1.3.2. Educational Context of the Problem

1.3.2.1. Computer Literacy

There is considerable controversy in the literature about what a computer literate person should know, but general agreement exists that computer literacy is important to all students (Johnson, 1980).

Rapid changes in computer technology itself may explain, in part, the lack of agreement about the meaning of computer literacy. These rapid changes alter the meaning of computer literacy (Frey, 1984), as reflected in Klassen's (1983) advice to individuals contemplating teaching computer literacy:

What is computer literacy? I think that each of you will have to deal with that in your own situation. It depends on the kind of institution that you are in, and the kind of graduates that you are trying to turn out. (p. 44-45)

The foregoing statement would suggest that considerable onus is put on individuals for the development of computer literacy training. For a given situation, people should be trained in accordance with local needs. This sentiment is extended by Frey (1984) in her statement:

In structuring a computer literacy course for staff development, an essential and very creative part of the development of the program would be in deciding what understanding, skills, and attitudes were appropriate for that particular group of teachers in that setting. (p. 3)
1.3.2.2. The Present Status of Computers in Education

As of September, 1984, there were approximately 27,000 microcomputers in Canadian schools (Sharon & Mehler, 1985). McNeill, (1985) estimates that by the beginning of 1984, there were approximately 300,000 computers in American schools. Another study estimated there were approximately 1.4 million computers in American schools by 1985 (Becker, 1987). In both Canada and the United States, the number of microcomputers per school is growing rapidly.

While there is a large increase in the availability of computer hardware in the schools, most teachers in the United States are not using computers (Boyer, 1983). Only 15% of American secondary teachers used the computer as a regular part of instruction in 1985 (Becker, 1987). Teachers generally felt computer literacy is important, but did not feel qualified to teach it (Stevens, 1980; 1982). Only 13% of school computer use was in math and language arts in 1985, while fully 50% of computer use in American schools dealt with the computer as a subject (Becker, 1987). In 1985, then, the computer was seldom used as a productivity tool in regular classes; a word processor was certainly not a major method of writing or learning to write in English classrooms (Becker, 1987).

Most teachers in the education system became teachers before the use of microcomputers became common (Molnar, 1978). This fact, combined with declining public school enrollments, and economic recession, has led to a limited hiring of new, computer literate teachers (Molnar 1978), where new, computer literate
teachers are available (Stevens, 1980; 1982). In 1985, 32% of teachers of high-ability classes had 50 or more hours of formal teacher training in computers, with 25% of other teachers having had 50 or more hours of such training (Becker, 1987). A majority of teachers, then, have had little training in computers. It appears, then, that in-service teachers will need retraining to use and to teach the use of computers if computer literacy is to be successfully taught in school. Wedman & Heller, (1984), note that the literature offers many, "tips and techniques" about how to conduct computer in-service for teachers, but what teachers themselves perceive as important about computers has been largely ignored. Innovators who ignore teachers' perceptions about an innovation may imperil the acceptance of that innovation.

Many technical innovations have failed in education in the last 20 years because of teacher resistance to change (Martellaro, 1980). Some examples of previous technological innovations that have had limited success in the classroom include: television, teaching machines, talking typewriters, and language laboratories (Boyer, 1983). According to Boyer (1983), teacher resistance to change may be partially caused by lack of consideration for teacher needs by implementers of change. Moreover, he noted, in a report on secondary education in America, that:

Once again, we have technology with little school-related content. Computer companies are aggressively marketing hardware and even giving sophisticated equipment to the schools while failing to help educate the teachers and failing to prepare first-rate material linked to school curricula or objectives (p. 191).

To minimize teacher resistance to change, teacher perceptions need to be taken
into account when introducing technological innovations, such as computers, into the educational system. This observation is clearly stated by De Landsheere:

Rather naively, it has been thought sufficient to point out 'rational' and 'effective' ways and means in order for them [technological innovations] to be adopted. However, due to the absence of 'contextual adaptation' (Bourdieu & Passeron, 1967), i.e. due to the failure to take account of the values, mentalities and attitudes which have been acquired by a special group of human beings - the teachers - in the course of a long personal and collective history, the contributions of technology have either been rejected as if by cultural antibodies, or - as Furter says - 'encysted in a modern enclosure' (Furter, 1980) (De Landsheere, 1982; p. 34).

Failure to consider the classroom teacher's perceptions of computers may add computers to the list of technological innovations which have had little longterm effect on education.

1.4. SIGNIFICANCE OF THE STUDY

The teacher is an often neglected part of the implementation process of an innovation into the school system (Boyer, 1983). Yet, if teacher resistance is to be minimized, the perceptions of the teachers involved must be taken into account when implementing technological change (Reif, 1983).

The goal of this study is to delineate, in a particular school, the perceptions of the English and Social Studies teachers, and of other teachers more peripherally involved in teaching humanities curricula, with respect to the use of a computer
lab established specifically for use by these teachers, with the ultimate goal to provide recommendations for schools in similar situations.

Many schools throughout North America are likely to be in the process of implementing computer laboratories during the next few years. The author feels that a significant benefit of this study may be the insights into teachers' perceptions of computers provided for consideration by future implementers in similar educational situations.

Failing to take into account teachers' perceptions may result in the computer becoming only an object of study in the schools rather than a productivity tool useful to all students, both in the classroom and in the world outside the classroom. A theoretical approach that takes into account perceptions is a constructivist perspective.

1.5. APPROACH TO THE PROBLEM

A constructivist theoretical approach was taken in this study. From the constructivist perspective, "'subjects' being studied must at a minimum be considered knowing beings" (Magoon, 1977). Teachers, like all other humans, perceive computers and computing based on previous experience and assimilated information. Reif et. al. (1983) call for studies to improve understanding of teachers' perceptions about technology.

Knowledge of this kind could help to devise improved methods of communication and participation for modifying people's existing
conceptions and facilitating their acceptance of change. For example, it would be desirable to carry out experiments where such methods are used to change the perceptions of parents and teachers about present educational needs or about the merits of new educational technologies (p. 228).

This study attempts to delineate perceptions about computers held by teachers from one school, both immediately before and one year after the implementation of a humanities computer laboratory. This information is used to suggest ways to facilitate the implementation of the lab into this school and to provide a set of recommendations of ways to facilitate computer implementation in similar schools.

According to the constructivist perspective, people's current perceptions affect their acceptance of new perceptions. Applied to this study, then, teachers' present perceptions of computers will affect their acceptance of computer technology.

1.6. THESIS OUTLINE

The remaining chapters of this thesis will include: the theoretical framework for the thesis, including Innovation Theory and the Constructivist Perspective, and a review of the relevant research (chapter 2); a review of the methodology, including the case study, the semi-structured interview technique, and a detailed discussion of the specific case (chapter 3); a discussion of results (chapter 4); and conclusions drawn from the results (chapter 5).
2. REVIEW OF THE LITERATURE

2.1. THEORETICAL CONTEXT

2.1.1. Introduction

This chapter will outline some important aspects of innovation theory, will summarize the implications of the constructivist perspective relative to this study, and will review the literature with respect to teachers' perceptions of computers.

Important in any implementation process are the perceptions of individuals involved in the implementation (Rogers, 1983). In education, the computer is a technological innovation; therefore, educators' perceptions of computers become important in implementing computers into the education system. For this reason, an overview of innovation theory is provided.

The study is premised on the viewpoint that a teacher's knowledge of, and experience with, computers is important to the process of computer implementation into the school system. Teachers, like all humans, use previous experiences and knowledge in perception. The study is directed towards the determination of specific teachers' perceptions of computers.

As outlined in chapter one, this study will take a constructivist perspective. From the constructivist perspective, it is recognized that previous experience and knowledge are integral to perception, and thus the learning process.
2.1.2. Theoretical Background

2.1.2.1. Innovation Theory

Diffusion is the natural spread of an innovation through a social system (Rogers, 1983). As an example of diffusion of an educational innovation, Hall (1981) refers to work by Mort (1953), which describes how kindergartens diffused throughout the North American educational system over a timespan of 50 years.

Diffusion has been defined by Rogers, (1983) as, "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 10).

In this study, the innovation is the computer. The idea of using the computer is communicated to specific members of a social system, in this case teachers. Communication is through multiple channels, such as administrators and fellow teachers.

Rather than allowing an innovation to spread naturally, the movement of an innovation through a social system can be deliberately induced by creating policy, passing laws, providing grants, and otherwise facilitating the process (Hall 1981). In B.C., the operations of the Provincial Education Media Centre, which supports the purchase and evaluation of software for B.C. schools, is an example of deliberately inducing the diffusion of computers in the school system.
Much of the past research in innovation theory was based on studies of farmers, with innovations such as hybrid corn, and medical doctors, in the implementation of new drugs. Examples of diffusion research from the educational field included the adoption of modern math, and driver education (Rogers, 1983).

Innovation research from all fields appears to have the same basic attributes (Rogers, 1983). Rogers (1983) outlines five attributes that affect the rate of innovation adoption. These five attributes are:

1. relative advantage;
2. complexity;
3. trialability;
4. observability; and
5. compatibility.

The first of these attributes, relative advantage (Rogers, 1983), means that if an innovation is perceived as considerably more advantageous than previous methods, the innovation will be adopted faster than if the innovation is viewed as only a slightly improved method. Thus, if teachers consider the computer as able to offer ways to markedly improve teaching methods, the computer is likely to be adopted more quickly into classroom use. There is, however, considerable evidence that most teachers are not convinced that computers can greatly improve teaching in their classrooms (Martellaro, 1980).

The second attribute, complexity, means that the more complex an audience perceives an innovation to be, the slower the innovation's adoption rate. Most teachers have very little computer-related training (Molnar, 1978). In consequence,
most teachers view computers as relatively complex (Martellaro, 1980). This perceived complexity is likely to slow the rate at which teachers implement computers into the classroom.

Trialability is the efficacy of trying an innovation on a trial basis. If an innovation can be tried, before it is adopted, then adoption will usually proceed more quickly (Rogers, 1983).

Microcomputers have improved the trialability of computers in the classroom by reducing the cost per computer. However, a 1984 survey of B.C. schools, by the British Columbia Teachers' Federation, showed a mean ratio of 1 computer to 76 students, with a range, amongst districts, showing as few as 14 students to 1 computer, to as many as 154 students to 1 computer (Computer Education, 1985). While the student to computer ratio may be decreasing, these figures show that in 1984, for many teachers in B.C., computers were probably not trialable.

The fourth attribute, observability, refers to the idea that to improve adoption rates, the results of an innovation should be easily observed by individuals not using the innovation. Unfortunately, many teachers who are successfully using computers are often in their classrooms, so other teachers are not free to directly observe the results of computer use (Martellaro, 1980).

Finally, compatibility deals directly with the perceptions of the individuals involved in the innovation. Teachers who perceive computers as a threat to their security
or livelihood, or as dehumanizing, or who have had past experience with unsuccessful technological innovation, may slow or stop the implementation of computers in their classrooms. Dealing with teachers' perceptions of computers when beginning the implementation of computers in a school, may increase compatibility, thus speeding up school adoption of computers.

The foregoing five attributes of an innovation may affect the rate of diffusion of an innovation. Each of these five attributes can be expected to play a role in the implementation of microcomputers in the case under study.

In an attempt to determine teachers' perceptions of computers, in an effort to improve understanding of the implementation of computers with these teachers, the study used a theoretical perspective which postulates the importance of previous knowledge and experience to new perceptions. This theory is the constructivist perspective, which is outlined below.

2.1.2.2. The Constructivist Perspective

The constructivist perspective in educational research has developed from a theoretical base in cognitive psychology (Magoon, 1977).

Man has been studying cognition since at least the time of the ancient Greeks, when Aristotle claimed perception to be, "a product of sensation and judgement" (Pourrelle, 1985). After waning interest in the study of cognition in the early part of this century the study has gained increasing acceptance since the 1960's
(Magoon, 1977). Part of this acceptance may be due to computers processing information in a manner suggestive of cognitive operations (Neisser, 1976). The following passage, from Ulric Neisser's book, Cognition and Reality (1976), illustrates how the computer processes information:

Computers accept information, manipulate symbols, store items in 'memory' and retrieve them again, classify inputs, recognize patterns, and so on. Whether they do these things just like people was less important than that they do them at all. The coming of the computer provided a much-needed reassurance that cognitive processes were real; that they could be studied and perhaps understood. (pp. 5-6).

The study of cognition, then, can be defined as the study of mental processes or, "the acquisition, organization, and use of knowledge" (Neisser, 1976). The possible existence and importance of mental processes, or cognition, is the basis of the constructivist perspective.

Magoon, (1977), outlined the assumptions underlying the constructivist perspective. These assumptions were:

1. The subjects being studied must at a minimum be considered knowing beings, and that this knowledge they possess has important consequences for how behavior or actions are interpreted;
2. The locus of control over much so-called intelligent behavior resides initially within the subjects themselves, although this capacity for autonomous action is often severely constrained; for example, by either explicit or tacit recognition of social norms; and
3. The human species ... [has] a highly developed capacity for:
The constructivist perspective, then, postulates that mental processes are a very important part of learning and perception. Individuals use considerable previous experience and knowledge in framing new perceptions. In this way, teachers today can be expected to have considerable knowledge of, and experience with, computers and related areas, with which they judge an innovation, such as classroom computer use.

The study attempts to describe what knowledge and experiences teachers may use in establishing perceptions of computer use. As teachers assimilate new information, based on their individual perceptions, learning occurs.

2.1.3. Relationship of Theoretical Background to Study

Teachers, like other people, use previous knowledge and experiences in their perceptions. Teachers' acceptance or rejection of innovations may be based on previous experiences against which the innovations are judged.

The study attempts to determine teachers' perceptions of computers, between June, 1985, and June, 1986. The study presents some recommendations for implementing computers into the school, and district, with respect to these
teachers' perceptions.

2.2. REVIEW OF THE LITERATURE REGARDING TEACHER PERCEPTIONS OF COMPUTERS

2.2.1. Introduction

Teachers' perceptions of computers are an important factor in teachers learning about computers (Martellaro, 1980). The purpose of this review is to determine the state of research with respect to educators' perceptions about computers. Most computers in education today are microcomputers. Consequently, the main focus of this review is the use of microcomputers in education.

The microcomputer first appeared in 1976, when 30,000 units were sold (Ahl, 1977). "The microcomputer, because of its low cost and availability, is becoming highly feasible for classroom utilization." (Bruwelheide, 1982). As hardware costs decreased, computer-based education was being examined by researchers more closely (Beck, 1979), and teachers were showing more interest in utilizing computers (Vensel, 1981). Since the advent of microcomputers, then, a small but growing body of literature, concerned with classroom computer use has become available.

In examining this literature, the present review overviews research in the field of computer implementation in the school system, as educators' perceptions of computer use are intimately linked with the success of the implementation
process.

An earlier review entitled, "Affective Considerations in Computer-Based Education", (Clement, 1981), examined the literature on attitudes of students, instructors, lesson authors, and administrators towards computers. The literature reviewed in this article, however, was written before the occurrence of the widespread popularity of microcomputers in education, and so is concerned mainly with attitudes towards mainframe computers. While mainframe computers have been used in education for many years, the advent of the microcomputer has made computers more accessible to educators. The attitudes measured by Clement, (1981) however, are worth examining as they reflect the reactions of educators to computers.

The present review will summarize Clement's findings about educators' perceptions towards computers, then will continue with research concerned with educators' perceptions not covered by Clement. Most of the literature since 1981 is concerned with perceptions of microcomputers, which are the dominant type of computer in education today.

2.2.2. Teacher Perceptions Of Computers

Clement (1981) begins his review by noting the importance of attitudes in any endeavor. He cites Knapper's (1978) findings that students who, resistant to computer implemented instruction, begin such a course and learn less than with conventional instruction. He also noted that much of the literature is speculative,
or based on poorly designed experiments. Moreover, he suggested that a poorly designed and/or overworked computer facility is likely to affect the results of any research, making it difficult to accurately judge computer-based material.

Educators’ attitudes towards computer use cited in the literature ranged from slight interest to open hostility, with most educators being indifferent (Clement, 1981). Teachers who use discussion-oriented instructional modes seem to have little difficulty adapting to computers, while for the lecturer or information-giver style of teacher, the introduction of computers can create severe problems.

Specific examples, given by Clement (1981), of instructor attitudes and behaviors, were illustrated in the following statements.

1. Wells and Bell (1980) have observed that it is tempting for teachers to remain aloof from computer instruction when students leave the classroom to go to the computer room;
2. Alderman and Mahler (1977) reported that community college teachers show themselves reasonably open to innovation, but at the same time closely guarded their prerogatives, especially their autonomy, in making curriculum decisions, in establishing goals of the course offerings, and in testing and evaluating their own instruction; and
3. Lagowski (1976) stated that college teachers thought that computer methods would be best viewed as adjunctive resources. However, even with this admission, he continued, some faculty members expressed themselves in ways which suggested that the computer was a competitor - although only a small fraction felt their jobs were threatened by the computer. (p. 29)
Clement (1981) suggests that Lagowski's statement, though seeming to be a contradiction, denotes a complex issue, where teachers' attitudes are not completely understood by the teachers themselves.

2.2.2.1. Survey Research About Teacher Perceptions

Much of the literature on educators' perceptions is in the form of surveys: Lichtman, (1979); Vensel, (1981); Computers?, (1982); Stevens, (1979, 1981) for example.

Lichtman's survey is essentially the same as a 1975 survey by David Ahl (1977), with six additional questions. As well, several surveys have been derived from Ahl's survey (Lichtman, 1979; Vensel, 1981; Elsworth & Bowman, 1982; Griswold, 1983), so a brief overview of Ahl's survey is appropriate.

Ahl (1977) surveyed four general categories of attitudes of the general public towards computers. These categories were:

1. computer impact on the quality of life;
2. computer threat to society;
3. understanding the role of computers; and
4. understanding the computer itself.

Mainframe computers, by 1977, were pervasive in society while microcomputers were extremely rare so this survey measures attitudes to larger computers. Ahl (1977) lists the following examples of computer use at this time:
1. supermarkets - the little product code you find on the side of virtually every food and grocery product;
2. department stores - a little "magic" wand, actually a tiny laser device, reads a product code from the tag;
3. medical facilities - hospitals frequently keep all their patient records on computers; and
4. telephones - every time you pick up the telephone and dial it you are actually using the largest general-purpose computer in the world - the switched telephone network.

It is interesting to compare the results Lichtman (1979) obtained in comparison to those of Ahl (1977). It should be noted, however, that Lichtman's (1979) survey was of a relatively small sample, in comparison to Ahl (1977). Lichtman's sample consisted of 189 educators, divided into 27 administrators (those in an administration course), and 162 teachers (those not in an administration course).

Ahl's (1977) sample consisted of 843 people who were divided into youth (those under 21) and adults (those 21 and over). Sampling techniques were not stated for either study.

Educators, in general, were less positive about the computer's role in society than were other groups polled. Lichtman (1979) drew the following conclusions based on his data in comparison to that of Ahl (1977):

1. that teachers view computers in a much more dehumanizing and isolating manner than do other segments of the population, especially school administrators;
2. that teachers do not feel secure in their relationships with computers, particularly in regard to privacy of data and mistakes, while administrators are more confident in these areas than are the general population;

3. that both teachers and administrators are more wary of computers in relation to jobs and skills (except their own) than are other people, with teachers much more concerned than administrators;

4. that a smaller number of teachers see improvement in the quality of life through the use of computers than do others, and that they see the least improvement in education of any group, while the administrators are overwhelmingly positive in this regard; and

5. that while teachers seemed concerned about the computer's effect on jobs in general, few were concerned about their own jobs being taken away.

Lichtman's (1979) survey is a superficial overview of educators' attitudes towards computers, taken from a narrow population. No statistical tests have been done to determine the significance of any of the study's findings. The major interest of this review in Lichtman's (1979) survey is as a snapshot of what educators' attitudes seemed to indicate just before the advent of the microcomputer, which markedly increased interest in computer-based education (Brewelheide, 1982).

Vensel (1981), using questions based partly on Lichtman's (1979) work, surveyed 23 pre-service special education students, finding his results in general agreement with Lichtman's (1979). After an initial survey, participants were exposed to a short, 45 minute demonstration of educational software. The original instrument was administered again, and showed a large increase in positive response. This
research was based on an extremely small convenience sample, \( (n=23) \), but may indicate that negative attitudes are related to a low level of computer literacy amongst pre-service teachers.

Another survey was the mail-in survey, conducted by the magazine Instructor (Computers?, 1982), towards the end of 1981. This survey dealt with educators' attitudes towards computers in the elementary classroom. The 4,000 respondents in this survey mentioned only microcomputers of various types. The findings of this survey indicated teachers, "are interested, open-minded, and ready to learn how this technology can make them more effective. Those who are becoming computer literate realize that the microcomputer holds great promise not only for their students but also for themselves as classroom managers" (p. 77). This survey also found no correlation between experience and the level of interest in computers. Moreover, the survey also noted implementation of computers in schools is a grassroots movement with, "individual teachers, kids, administrators, and parents that made the movement snowball" (p. 76).

The words, "individual teachers", may imply that this survey is not a reflection of the population of teachers as a whole. Instead, the population may consist of only those teachers who have become excited about computers in their classrooms, and who mailed in a response. Nevertheless, from this survey's results it appears that, by 1981, microcomputers were being actively utilized in school programs, at the grassroots level.

Dorothy Stevens in two research articles (Stevens, 1980, 1982), studied
perceptions of in-service teachers, teachers' college faculty, and pre-service teachers in Nebraska, in 1979 and 1981. Stevens (1982) noted that, during 1978-79, only 29 schools in Nebraska had some form of computer assisted instruction. By 1981, this had changed so that 90% of schools had access to computers, and 85% of schools had microcomputers. Stevens (1982) does not suggest that schools in Nebraska have adequate hardware, only that, "it does confirm strongly a growing and continuing interest in computers in education and does focus heavily on the need to train teachers and support staff" (p. 230). These studies indicated teachers feel that high school students should become computer literate; however, they lacked the necessary computer literacy skills to help their students. The 1981 survey also noted that computer anxiety, for in-service teachers, and teacher educators, had lessened during the years between 1979 to 1981, while student teachers' anxiety towards computers had increased. The increase in student teachers' anxiety is a potentially disturbing finding in light of the student teachers' apparent lack of concern over emphasis on computer knowledge. Generally speaking, the student teachers in both these surveys seemed more conservative than the in-service teachers and teacher educators.

Both of Stevens' studies featured slightly over 50% return rates, from random samples of 1 202 subjects (1980), and 1 200 subjects, (1982). This larger sample may point to more reliable results than some other studies discussed in this paper, such as Vensel (1981).

A 1981 survey distributed in 31 school districts in New York State, (Terzian, 1981), seemed to reflect Steven's (1981; 1979) results, but too little data is
A study in Alabama, of 232 undergraduates in early childhood and elementary education, and 55 instructors of these students, determined that, in both groups, the affective and cognitive domains of instructors differed substantially from the students, while the early childhood and elementary education groups of students differed very little from each other (Walters, 1982). Unfortunately, only the abstract of this study was available to this researcher; more details about these findings would be useful in interpreting Walters' (1982) results.

In a report of another study, available to this researcher in abstract only, 464 teachers in Louisiana were surveyed, to, "delineate, analyse, and document the reasons teachers may avoid using computer technology." (Stenzel, 1982). Of the 464 teachers surveyed, 369 returned their questionaires. While statistical results were not detailed in the abstract, these general findings were presented, as follows:

1. Teachers had generally positive attitudes toward computers;
2. A positive relationship appeared to exist between the educational degree possessed by a teacher and the perceptions the teacher had of computers;
3. Age, gender, teaching level, and teaching fields did not appear to be significant factors in teachers' predispositions in learning about computers;
4. A significant relationship appeared to exist between teachers' perceptions of negative factors surrounding computers and perceptions of the usefulness of computers; and
5. 64% of teachers wanted to learn about computers at their own
Without more detail about how this study was conducted, one can only note that the study seems to generally find the same results of other similar studies such as Stevens, (1980, 1982) for example.

Vermette, Orr, & Hall (1986) surveyed 37 female and 13 male elementary school teachers about these teachers' attitudes towards computers in comparison with 116 elementary school students. The purpose of the study was to, "attempt to assess the current state of efforts to integrate microcomputers in education" (p. 41). Conclusions indicated that these teachers' opinions about computers tend to be more conservative than the elementary students rather than reflecting any strong polarization of opinion. The study sample of elementary teachers and students was small; it would be helpful to know when this research was performed in order to better understand how generalizable these results are.

Norris & Lumdsen (1984), in Denton, Texas, have attempted to determine the attitudes of educators as a factor of functional distance. These researchers designed a questionnaire consisting of three statements. The three statements were designed to test changes in educators' attitudes towards computers as the statement struck closer to personal vulnerabilities, or 'home'. Four hundred fifty public school educators were given the following three statements:

1. Computers are valuable tools that can be used to improve the quality of education;
2. Teachers should know how to use computers in their classrooms;
and

3. I would like to have a computer for use in my classroom.

Positive response percentages correlated as follows: 1) 85.5%, 2) 81.4%, 3) 66.2%. Significant differences were found between statements 1 and 3, of 19.3%, and between statements 2 and 3, of 15.2%. Statement 3 was considered to be closer to 'home' to the educators, and positive response to this statement was much lower. This study may have suggested that educators' attitudes towards computers are positive, as long as implementation of computers is not imposed on their classrooms.

Karen Peterson (1984), divided volunteer teachers, in a Kansas senior high school, into three groups, composed of two treatment groups and a control group. All three groups were given information, by letter, about availability of hardware and software. Group one members were further advised that they would be contacted about an individual in-service. The letter to Group two advised group members to contact the researcher if they wished to participate in an in-service. The letter to the control group did not mention training sessions. The only significant correlation in reactions from the three groups was that participating teachers felt a need to learn computer operations, and members from all groups sought help from Peterson. Very little information about the methods used in this experiment was available. If the results were reliable, the findings were very interesting, as it appears that teachers, if they feel a need, will seek help to learn about computers.
Griswold (1983) found that an internal locus of control was the major
determinant in educators' increased computer awareness. This internal locus of
control suggested that a person perceives events as being under personal control.
Males and older individuals were found, generally, to have greater computer
awareness, as were those individuals with more college math courses.

At Eastern Montana College, a survey was conducted of 119 education students,
53% of whom were graduate students, and 47% of whom were undergraduates.
The whole group had a mean age of 29; 74% were female. Griswold (1983)
suggested that, "external orientation, age, and sex may set up barriers toward
realistic understanding of computers." Griswold (1983) cautions against generalizing
these results past, "teachers or students with teaching aspirations in rural
areas". These results indicate that individual differences need to be considered in
determining instructional strategies for teacher in-service programs.

Using the same instrument as in his 1983 survey, Griswold, (1985) studied the
attitudes of education and business majors towards computers. The education
majors again showed similar attitudes to Griswold's previous (1983) study. On 18
of the 20 items on the questionnaire, education majors were found to have
significantly more negative attitudes towards computers than did business majors.
Griswold (1985) attributes much of the difference in attitudes held by the two
groups to a lack of exposure to computers by education majors. Griswold's (1985)
findings appear to support Stevens' (1980, 1982) findings that pre-service teachers
are not being exposed to computers. Griswold concludes that:

As teacher education continues to struggle with the issue of preparing
teachers for the computer age, we are reminded that computer training must be integrated throughout the teacher education curriculum, just as teachers should integrate it throughout their own classroom curricula, and just as students will find the computer integrated throughout society (p. 137).

Researchers at the University of British Columbia surveyed the views of three separate groups (Goddard & Pereira-Mendosa, 1984). The first survey was a stratified, random sample of 434 teachers (FIELD), the second survey was of 278 teachers, after a one hour introductory computer workshop (WORKSHOP), and the third survey was of 88 faculty of education members (FACULTY) (Goddard & Pereira-Mendosa, 1984). The FIELD and FACULTY studies surveyed specific populations on a broad range of computer-related topics, while the WORKSHOP sought software suggestions. These researchers concluded that a teacher's subject/s or grade/s taught, and that teacher's sex and academic background are not major factors determining perceptions of computer literacy. FIELD data showed that a computer in the school does have a positive effect on teachers' perceptions of computers. Only the findings common to all three studies have been published, so interpretation of individual group results is difficult, and may not lend itself to comparison for some other studies in this paper.

In an attempt to improve understanding of the process of implementation of computers, Wedman and Heller (1984) have studied the attitudes of 87 in-service teachers at five sites in Iowa. These researchers noted that most literature deals with, "tips and techniques", for giving computer in-service, but, "there is a noticeable lack of both empirical evidence and theoretical underpinnings to support
... in-service design suggestions" (p. 31). Wedman and Heller (1984) base their research on the Concerns Based Adoption Model (CBAM), which attempted to theorize some different stages of concern for individuals as they deal with an innovation. Their seven stages of concern were the following:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Title</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Awareness</td>
<td>Unconcerned about the innovation.</td>
</tr>
<tr>
<td>1</td>
<td>Information</td>
<td>Concerned about the general characteristics of the innovation.</td>
</tr>
<tr>
<td>2</td>
<td>Personal</td>
<td>Concerned about the relationship between one's role and the demands of the innovation.</td>
</tr>
<tr>
<td>3</td>
<td>Management</td>
<td>Concerns about the time, organization, and management of the innovation.</td>
</tr>
<tr>
<td>4</td>
<td>Consequences</td>
<td>Concerns about the impact of the innovation on student outcomes.</td>
</tr>
<tr>
<td>5</td>
<td>Collaboration</td>
<td>Concerns about working with others using the innovation.</td>
</tr>
<tr>
<td>6</td>
<td>Refocusing</td>
<td>Concerns about something better than the innovation.</td>
</tr>
</tbody>
</table>

Using the Stages of Concern Questionaire, developed by Hall and Rutherford (1976), Wedman and Heller (1984) found teachers' concerns to lie heavily in the (0) Awareness, (1) Information, and (2) Personal areas of concern. If this is a representative sample, inservice training should meet teachers' affective needs, if computer technology is to be used by most teachers.
Cicelli and Baecher (1985) also used the Stages of Concern Questionnaire to survey the attitudes of 78 self-selected teachers. Cicelli and Baecher (1985) caution that one must be careful in interpreting results, given the weaknesses of study design, but these results are in agreement with those of Wedman and Heller (1984), with teachers' concerns lying in the areas of (0) Awareness, (1) Information, and (2) Personal.

A case study approach was taken by Stecher (1984) in studying the implementation of a computer inservice program for teachers. The program resulted when a major microcomputer manufacturer donated 15 microcomputers and appropriate software to every secondary school in a three state area. In addition, each school was able to select 4 teachers for a 120 hour summer in-service, given by the manufacturer. Data, for analysis of the program, was collected in four ways, as follows:

1. direct observation at three program sites;
2. informal conversations with participating teachers; and
3. documents including:
   a. daily journals of participants;
   b. lesson plans developed by Special Interest Groups (SIGs) amongst participants;
   c. reviews, by participants, of professional journal articles;
   d. trainers' written materials; and
   e. written, open-ended, evaluations of the program, completed by all participants.

The program appears to have been a very positive experience for all volunteer participants. Not all participants, however, were volunteers. It should be
remembered that the program studied may have been close to ideal, and that these conditions may not be easily replicable in most cases. This caveat should be kept in mind when reading the following 7 recommendations Stecher (1984) provides to improve computer in-service for teachers:

1. Ensure adequate facilities are provided;
2. Plan in-service schedules to provide extensive hands-on time and to reduce distractions and inconvenience;
3. Utilize effective techniques. Specifically, develop clear goals and objectives, structure the lessons in an organized manner with adequate introductions and guided practice, and incorporate assignments that make teachers use the software;
4. Focus on integrating the computers into the instructional process;
5. Include activities that encourage interaction among teachers and sharing of information;
6. Select training personnel who have adequate knowledge, experience, and an ability to communicate with teachers; and
7. Make participation voluntary.

In a paper presented in 1984 John Olson described ongoing qualitative research into teacher use of the microcomputer in the classroom. Olson's research starts from the following four questions:

1. What kinds of goals do teachers seek in their use of microcomputers; what balance exists between socialization and education goals and are there conflicts between such goals?
2. How do teachers construe their influence over classroom events involving microcomputers?
3. What contextual factors affect the way teachers construe their influence in the classroom when using microcomputers: knowledge of microcomputers; abilities of children; access to courseware and
other support; class behavior?

4. Do teachers differ across school divisions in the way they construe their work with microcomputers, and in the factors that affect how they view their work? (p. 9)

Olson approached these questions using a repertory grid. Teachers were asked to group 30 "situations", describe what was common to the grouped situations and to compare the group or "construct" to its polar opposite. The 30 situations were then evaluated using the constructs and a repertory grid formed.

A follow-up interview protocol was then developed by analysing the grid. During the interview, teachers were asked to comment on their grids so teacher thinking could be probed in depth. Preliminary results indicate that teachers can integrate the computer into their classrooms, by adapting present teaching techniques to the computer. Examples of this include monitoring student progress, rewarding students, fixing equipment, and introducing new things. There are also some new things that the teacher now has to deal with such that familiar techniques or routines may no longer be adequate. Some of these unresolved situations include:

1. What to do if the students get really stuck and you can't help them? The way programs are made may make it difficult for teachers to help their students. The "pages" of the computer are not in view.
2. How to assess the requests of students for more of what is on the computer?
3. Is the computer just another adjunct of the teacher's teaching; something to be managed as an auxiliary?
4. What if the computer is teaching something the teacher doesn't teach?
5. What if the computer is asking for types of intellectual activity the teacher doesn't stress?
6. What if the student asks the teacher for advice about what is going on in a program thus placing the teacher in an auxiliary role?
7. Who is managing whom in this case?
8. Who is doing the teaching?
9. What does it mean to fully use the potential of the computer?
10. What is the potential? (p. 14)

2.3. CONCLUSIONS

This review of the literature suggests that, as the use of microcomputers becomes more prevalent in education, teachers seem to be becoming more positive about computers. If teachers do not feel personally threatened by computers, this positive attitude appears to be heightened (Norris & Lumsden, 1984).

Some researchers suggest that computers in the schools, where the teachers could use them as they felt necessary, seemed to improve teachers’ attitudes (Goddard & Pereira-Mendosa, 1984). The researcher, in his review of the literature, found mixed evidence about the significance, on teachers’ attitudes towards computers, of such factors as: age, gender, teaching subject, teaching level, and academic background. However, no study reviewed found these factors to be major influences on teachers’ attitudes towards computer use.

There was some evidence which showed that student teachers have more negative attitudes towards computers than do in-service teachers (Steven, 1980; 1982,
Griswold, 1985). Some evidence suggested these individuals are members of a, "lost generation", who leave high school after computers are generally perceived to be needed in the school, but before computers are actually in widespread use (Stevens, 1982). This is a potentially troubling finding, as these individuals are the teachers of the future.

The use of computers in schools was found, in this review, to be a personal issue where teachers use computers if they feel a need. Having computers available in schools is likely to improve teachers' perceptions about computers, as interested teachers can explore computers before committing themselves to using a new technology.

Computers are an innovation just beginning to be implemented in the schools. It is difficult to judge whether implementation will proceed quickly enough to avoid a, "lost generation", of students who didn't learn about computers in school, but need this knowledge to function in a computerized society. This review found that most teachers seem to realize that computer knowledge is necessary, and teacher attitudes generally seem to indicate that teacher intransigence is not the limiting factor in implementing computers into the education system.

While a general picture of teachers attitudes is presented in this review, detailed information about what individual teachers are thinking is in short supply. How individual teachers expect to become familiar with the computer and how teachers' perceptions are affected by the implementation of a computer lab in their teaching environment are questions which are not answered by this review.
This study is designed to answer these questions with an in-depth look at the perceptions of one group of teachers undergoing such an implementation.
This study attempted to outline the perceptions of computer technology held by the members of one school's teaching staff. Staff concerned, who were directly affected by the introduction of a humanities computer lab, were the members of the English and Social Studies departments. The school's implementation, in the fall of 1985, of a new computer facility to service the school's humanities courses resulted in opportunities for increased computer use by these teachers. Empirical evidence drawn from this study was the basis for recommendations for improved and extended computer implementation by these teachers and district teachers in general.

While a variety of computers were in place at this school, these resources in June 1985 were utilized by relatively few staff members. The computers present in the school had been purchased primarily for speciality areas such as Business Education, Computer Science, and Electronics. With the pending implementation of a Humanities Lab, teachers, who previously had little involvement with school computers in these speciality areas, would become involved in school computer use in their areas of teaching expertise. Many humanities teachers had little or no experience with computers of any kind at this time.

In June, 1985 these humanities teachers were interviewed in an attempt to delineate their perceptions of computers before the advent of the humanities computer lab. By re-interviewing each teacher in June, 1986, the researcher attempted to determine the changes in humanities teachers' perceptions of
computers in the school.

In this chapter, the case study research approach is described. Interview methodology is outlined, since semi-structured interviews are the researcher's major form of data collection. A description of the case, study design, and research methodology is also undertaken.

3.1. THE CASE STUDY

To facilitate the focussing of this study on a particular case or situation, a case study approach was used for this research. In this instance, the case was a group of teachers directly affected by the installation of a humanities computer laboratory in a particular senior high school in northern British Columbia.

The researcher will first outline the case study research approach, and then will undertake to describe why the case study is most appropriate for this research problem.

The case study has been defined by Goode and Hatt (1952) in the following way:

The case study, then, is not a specific technique. It is a way of organizing social data so as to preserve the unitary character of the social object being studied. Expressed somewhat differently, it is an approach which views any social unit as a whole. (p. 331)
Problems which can occur in non-case study types of educational research, such as the loss of individual uniqueness as only generalized characteristics are retained, can be addressed by a case study approach. The unique properties of the case or situation are retained. The case, rather than being scientifically generalizable, has been characterized as naturalistically generalizable (Stake, 1978).

What becomes useful understanding is a full and thorough knowledge of the particular, recognizing it also in new and foreign contexts. That knowledge is a form of generalization too, not scientific induction but naturalistic generalization, arrived at by recognizing the similarities of objects and by sensing the natural covariations of happenings. To generalize this way is to be both intuitive and empirical, and not idiotic (Stake, 1978, p. 6).

The case study, then, may provide a reader with, "a cognitive experience, which may be more easily integrated into a reader's existing experience than is a quantitative record" (Stake, 1980). The cognitive experience is possible because a case study focuses on a single case, providing a detailed description of that case, which may provide cues sympathetic with a reader's experience (Stake, 1978). A reader may thus experience naturalistic generalization, from reading the case.

If naturalistic generalization by the reader is a potential advantage of the case study, the major disadvantage may be the researcher's tendency to read too much into available data (Goode and Hatt, 1952). This problem may be partly overcome by the researcher's use of a variety of data sources (Stake, 1980).

There also exists a role for the research consumer. The reader bears a certain
responsibility for personal interpretation of study results (Stake, 1980). The reader's responsibility may be made more clear by the following quote from Easley (1982):

Case studies are basically short histories, and many historians agree that histories are not objective descriptions but are written from the point of view of the issues of the time of the historian. (p. 197)

The reader, then, is likely to have a somewhat different point-of-view from the researcher, and must interpret case study research results accordingly.

3.1.1. The Case Study Approach And The Present Study

The researcher has spoken informally with a number of teachers, from various areas of British Columbia, about the progress of computerization in their schools. These informal conversations took place at computer conferences, in schools, and at the University of British Columbia between 1980 and 1984. At the time of this writing, none of these teachers had experience with, or had heard of, a computer laboratory dedicated to a school's humanities courses. Given this informal measurement, the researcher feels that it would be difficult to conduct a quantitative study which would determine commonalities amongst various schools in British Columbia.

On the other hand, a case, as is described following text, can lend itself to a reader's naturalistic generalization, regardless of the reader's immediate environment. As computerization of British Columbia schools continues, future
implementers may be able to use the experiences documented in this study in designing their own computer implementation programs.

3.2. THE INTERVIEW

The semi-structured interview was the major data collection instrument used in this study. Issac and Michael (1971) describe the semi-structured interview in the following way:

Semi-structured interviews ... are built around a core of structured questions from which the interviewer branches off to explore in depth. Again, accurate and complete information is desired with the additional opportunity to probe for underlying factors or relationships which are too complex or elusive to encompass in more straightforward questions (p. 96).

In this researcher's opinion, the interview instrument offered increased validity over other possible methods of collecting data in this study for the following reasons:

1. Rapport can be established in a one-to-one, face-to-face meeting with respondents (Sowell & Casey, 1982);
2. The interviewer can encourage the respondent and seek clarification of answers (Sudman & Bradburn, 1983);
3. The interviewer can seek greater depth in questioning compared to a questionnaire (Issac & Michael, 1971); and
4. The interviewer can probe for more complete answers compared to a questionnaire (Issac & Michael, 1971).
Each interview was audiotaped to aid the researcher in isolating teacher perceptions from the interviews. Bolsky (1967) makes the following comment about recording interviews:

Where very many topics are going to be covered at a meeting, this may be the best way of insuring that you don't forget important facts or concepts. Also, the use of a recording machine frees you from the necessity of taking detailed notes, and you can thus take a more active part in the conversation. Finally, the use of a recording machine can be invaluable if you need to obtain much specific information from someone, which he would otherwise have to write down himself. It can enable him to provide the needed information in a fraction of the time, and in a much easier and more convenient manner than writing (p. 51).

This interview situation had an added complexity which is not usually specifically considered by individuals writing textbooks on interviewing. This complexity will be briefly explained below.

3.2.0.1. Interviewing One's Peers

The researcher, like the respondents in this study, is a school teacher. Further, the researcher is a teacher in the same district as the respondents. Some cautions about this type of situation have been outlined by Jennifer Platt (1981):

1. It seems offensive not to give some honest and reasonably full account of the rationale and purpose of one's study to such respondents;
2. People interviewed may implicitly define themselves as informants
rather than respondents; rather than offering raw data, interpretations and conclusions may be offered;

3. Similar experience with a respondent can lead to carelessness. Not accepting a point quickly can seem pedestrian and unintelligent but may be necessary to get clear and explicit data; and

4. Where it is assumed norms are shared, their rationale and content do not need explanation, and thus the data become thinner; to ask for explanation is to define oneself as not a member of the same community.

Rather than causing a potential loss of the reader's confidence in this research situation, the foregoing cautions should be kept in mind by both the researcher and the reader.

The following section gives details of the case of interest in this study.

3.3. THE CASE

3.3.1. Description Of School

The school is situated in a small town, in northeastern British Columbia. The school, in 1984-85, had approximately 600 students from grades 10 to 12, and a staff of 36 teachers and 2 administrators.

The teaching staff's experience with computers ranged from members with a strong computer background, reflected in the school's computer science program, to
inexperienced computer users.

In June, 1985, the school had a total of 14 Apple ][+ computers, Apple ][+ compatible computers, and Commodore PET computers in a computer classroom. There were also 4 Commodore PET computers in the business education area, and 2 Commodore PET computers used in producing the school newspaper. Several other personal computers, which were the personal property of teaching staff members, were in various classrooms in the school. These computers were used, by their owners, in activities such as recordkeeping.

An English/Social Studies computer room, referred to as the humanities computer laboratory, was implemented in the school in September, 1985. This laboratory contained 14 Apple //e computers. Early in the school year an aide was hired to supervise in the lab. The lab was thus open from 9:30 am to 4:00 pm for student use. While this study was concerned with the English/Social Studies computer room, it should be noted that a 30 computer laboratory of Apple Macintosh computers was also implemented in this school in the fall of 1985. These Macintosh computers were used in teaching Computer Studies 11, Computer Science 12, and Business Education.

The presence of these computers and the future plans for additional computers reflected the district’s strong commitment to implementing computer use both in this school, and the district’s long range commitment to computer use throughout its schools.
3.3.1.1. The Decision-making Process

The way decisions, for establishing and implementing the humanities lab, were handled influenced the subsequent use and perceived success of this lab. Both school staff and district personnel were involved in the two major decisions, the creation of the lab facility, and the purchase of suitable equipment.

It should be remembered that at this time there were few, if any, computers available for teachers to integrate into their programs. However, near the end of the 1984/85 school year, the school found it would have approximately $20,000 available as part of a budgetary surplus for the English and Social Studies departments. The members of these departments were in turn subjected to some pressure. As the principal says:

As soon as we had the money in place, we had three or four meetings about its use. It was quickly decided right at the first meeting that we would try to put together a humanities computer lab. Either that, or the money would simply go back into the other departments, because there really aren't a lot of things you can buy for English or Social Studies. (P, 1985)

While there may have been some pressure on the humanities staffs to purchase computers with their shares of the budgetary surplus, it was originally a staff decision to divide the money in such a way as to provide the humanities departments with the funds. At no time did any staff members interviewed indicate that they had felt pressure to decide in favor of a humanities computer lab. In fact, this was a popular decision. One teacher expressed this issue in the
Putting in a computer lab is an excellent idea. I think we are playing catch-up here. Central [a junior high feeder school] is way ahead of us here. So we are playing catch-up and we have to play catch-up. The students are going to be coming into the school, who are already computer literate on a number of different kinds of computers. If we don't catch up they are going to say, "Well, what do you have to offer?" (I7, 1985).

Staff members of the school and district administrators appear to have come to a similar conclusion as to the necessity of computer use in the school. This is illustrated by the fact that, when given the opportunity, the staff chose to address this issue by deciding to install a computer lab.

3.3.2. The Case

The case will be considered to be the teachers' perceptions of computers during the implementation of the humanities computer laboratory in the school. An attempt was made to interview all teachers directly concerned with the implementation. It was expected that these humanities teachers would feel pressure to integrate the computer into their classroom practices.

Experienced computer users in the humanities areas were considered likely to be approached by naive users as consultative sources in computer implementation.

District administrators, responsible for overseeing computer implementation in the
district, and the school’s principal were also interviewed in an attempt to
delineate the context of the school’s use of computers.

No attempt was made to scientifically generalize results from this case, as
conditions in the school under study are likely to be unique in comparison to
other schools. Nevertheless, some understanding generated in this study may be
of interest to future researchers, and individuals attempting to introduce
computers into other schools.

3.4. DESIGN

The proposed study consisted of two parts. The first part involved interviewing
pertinent teaching staff at the school, to discover their perceptions of computers.

The second part of the study involved reinterviewing teachers, in June, 1986, to
determine changes, if any, in teachers’ perceptions of computers. From this
monitoring process the researcher attempted to determine changes in teacher’s
perceptions during the process of implementation. The researcher then generated
final recommendations for computer implementation, which were presented to the
School Board.

3.5. METHOD

Permission was obtained for the researcher to conduct research in the district
concerned. In concert with appropriate district authorities, a decision was made
about the selection of the particular school in which to conduct the research. Contact with the school’s administration was made, and permission and dates for the research established.

A semi-structured interview protocol has been developed (see appendix 1) to elicit teacher perceptions of computers in the areas of personal use, use with students, and factors affecting these uses.

Teachers and administrators concerned with the humanities lab in the school were interviewed using the foregoing format. The interviewer’s aim was to provide a relaxing and informal environment where the respondents would feel able to express pertinent opinions and knowledge about computers. District administrative staff who were directly concerned with the implementation of computers in the district were interviewed. Only staff who volunteered to participate in the research were interviewed. All staff concerned volunteered.

The interviews took place June 25 - 28, 1985, and June 23 - 24, 1986. Each interview lasted approximately 20-30 minutes. All interviews were audiotaped.

After the first set of interviews, teacher’s perceptions were isolated and catalogued from transcripts of audiotapes. This process was repeated after the second set of interviews and the two sets were compared to determine changes.
4. RESULTS

4.1. REVIEW OF THE PROBLEM

Various educational technologies, such as educational television and language laboratories, have had limited success in the classroom. A technology's failure to succeed in the classroom may be due to the innovator's failure to consider teacher perceptions of the new technology (Boyer, 1983).

Computer use in education is a relatively new application of a technological innovation. The purpose of this study was to detail the perceptions of a particular school's teachers, in a situation where they may be feeling pressure to use a computer laboratory in their teaching. These perceptions were analyzed with a view to structuring recommendations that may assist the implementation of computer labs in a similar educational setting.

The presentation of this analysis is based on a report of one school's teachers' perceptions of the implementation of an English/Social Studies computer lab. Using a semi-structured interview format, data was collected on two different occasions.

The results of these interviews will be presented in three major sections, as follows:

1. Section One, Teacher Profiles, specifically outlines the perceptions of some of the teachers involved in the implementation of the computer laboratory.
2. Section Two, June 1985 Interview Results, discusses how these teachers perceive microcomputers to affect themselves and their jobs, before the implementation of the computer lab. The following questions are addressed:
   a. Do these teachers feel computers may be important to students?
   b. What factors might affect computer use in classes?
      1) How do these teachers anticipate the use of the computer lab with their classes?
   c. To whom will teachers turn for help when implementing computers into their classrooms?

3. Section Three, June 1986 Interview Results, discusses how these same teachers perceive microcomputers to affect themselves and their jobs one school year after the implementation of the computer lab.

The purpose of this study is to examine the perceptions of a group of teachers concerned with the implementation of an humanities computer lab. Individual teachers have been grouped according to their perceptions. While each teacher has an individual's perceptions, some generalizations from this study group are possible. The following section outlines how and why teachers were grouped in this study.

4.2. THE TEACHERS: A PROFILE

Each teacher's previous computer experiences influenced the perceptions that individual had about the implementation of the lab. Two basic groups, however, emerged from the interview process in June, 1985. As noted in Table I, these
groups have been labeled Experienced Users and Naive Users, since the researcher will refer to these two groups at appropriate times in this thesis.

Teachers whose assignments are concerned primarily with English and/or Social Studies are discussed as Central to this study. Teachers assigned subjects partially or completely out of the areas of English and/or Social Studies are discussed, but they are somewhat Peripheral to this study.

All the Experienced Users were also computer owners. As noted in Table I below, four of these individuals owned Commodore personal computers (PET and VIC 20), while the fifth Experienced User owned an Apple compatible, Circle personal computer.

Three of these teachers were Central to the study as full-time teachers in the humanities areas. One other individual in this group, a librarian, was of more Peripheral interest to the study. All Experienced Users had spent in excess of ten years in the classroom. Included in this group were the heads of both the English and Social Studies departments. Three Central members of this group described their understanding of the computer in the following ways:

I have just a basic understanding of programming ... I can use one comfortably. Literacy is probably the wrong term. Literacy might imply a more technical knowledge and I don't think that's necessary. (T5, 1985) ↑

↑ The "T5" is the researcher's method of identifying the teachers involved in the study. The researcher gave a number to each interview according to the order in which the teachers were interviewed in 1985. Following the interview designation
I am computer literate. [Which is] probably the same as any other kind of literacy. If you are talking about reading, you can take a book and extract the information or enjoyment out of it because you have the reading skills. (T6, 1985)

If you give me a piece of software and it's user friendly, it's got easy to use instructions, then I can use it. Other than that, I'm not interested. (T1, 1985)

These teachers had interacted with computers enough to be able to form a realistic sense of the computer's worth to them. Previous to the 1985/86 school year, Experienced Users utilized the computer in some or all of the following ways: personal writing, marks, database work, and programming. One experienced user also used computers to word process in his journalism class. Another experienced user had been in a school with a computer lab in Ontario.

No Naive Users, on the other hand, owned computers, although several of these individuals were considering the purchase of a computer at the end of the 1984/85 school year. Three members of this group were Central to the study, as full-time, or nearly full-time, teachers in the English and/or Social Studies areas. The two other, more Peripheral, members of this group, were a language teacher, and a teacher whose major area was Physical Education. Unlike the experienced group, this group's years of teaching experience was much more varied, including a first year teacher and two teachers with well over ten years' experience each. These individuals described their understanding of computers

†(cont’d) is the year in which the interview took place.
using the following phrases:

I don't feel comfortable with computers. My daughter going into grade nine feels fairly comfortable, my daughter in grade five feels as comfortable with computers as I do with tape recorders. (T7, 1985)

I've never been on them enough to even understand what I'm doing. (T8, 1985)

I am totally illiterate. [Which is to] be able to plug something in, recall something, program something, understand the keywords and how it works. (T11, 1985)

Probing revealed that the total computer related experiences of most of these individuals consisted of one, or possibly two, local, half-day in-services.

Table I: The teachers involved with the Humanities Computer Lab.

<table>
<thead>
<tr>
<th>Experienced Users</th>
<th>Naive Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Dep't Head (PET)</td>
<td>S.S. Teacher</td>
</tr>
<tr>
<td>Central</td>
<td></td>
</tr>
<tr>
<td>S.S. Dep't Head (PET)</td>
<td>Eng./S.S. Teacher *</td>
</tr>
<tr>
<td>Eng./S.S. Teacher (VIC 20)</td>
<td>Eng./S.S. Teacher</td>
</tr>
<tr>
<td>L. A. (Circle) *</td>
<td>P.E./Eng. Teacher</td>
</tr>
<tr>
<td>Peripheral</td>
<td></td>
</tr>
<tr>
<td>Librarian (PET)</td>
<td>P.E./S.S. Teacher *</td>
</tr>
<tr>
<td>* designates teachers interviewed in 1985, but not in 1986.</td>
<td>French Teacher</td>
</tr>
</tbody>
</table>
The following section has been included to give a more detailed representation of the perceptions of particular individuals from three of the four groups. The two members of the experienced group Peripheral to the study were not profiled, as this group had little involvement with the lab.

4.2.1. Individual Profiles

The primary focus of this chapter is the group of teachers involved in the implementation of the humanities lab. Each teacher is, however, an individual with an individual's perceptions of the lab. In order to flesh out the characters and give some depth to the study, the perceptions of four teachers will first be outlined. The first two teachers were Experienced Users, Central to this study. The third was a Central, Naive User, while the last teacher was a Peripheral, Naive User. These teachers are representative of the perceptions of their groups, as these groups have already been defined.

4.2.1.1. T6

As the English department head, this teacher was heavily involved in the decision to install an Humanities Computer Laboratory. This teacher had extensive experience with computers. He had purchased his own Commodore PET computer and had two PET computers, which were used mainly in producing the school newspaper in his classroom.

I'm using those machines extensively in my journalism class. All our newspaper stories are done on that and all our newspaper accounting
and advertising information is contained on computers. I use them for my marks and for attendance. (T6, 1985)

The introduction of the new computer facility was not seen by this teacher as likely to affect him individually that much. He hoped that the lab would provide students with opportunities to use the lab's 14 computers. With so few computers compared to the size of the student body, this teacher thought it would be unlikely that all students would be able to word process all their work, even if they all wished to do so. This teacher anticipated that, depending on the course, finding time to use the lab would be difficult, and that changing one's teaching to use the computer lab would be difficult because of lack of time.

I don't think there is enough time in some of the courses to be able to fully exploit the capabilities of the word processor. In a grade ten setting that I'm mostly involved with, or a 12 ME setting, there might be time to play around with that and to get students basic instruction in it, and maybe even work towards doing several compositions on it, exploring how it can help you in composing, not just writing. (T6, 1985)

This teacher felt that a great fuss was being made over something that really was not a major change. The computer lab was merely a new tool which could speed up the same tasks students had always done.

My feeling right now is that it is a mountain being made out of a molehill. That this is no more significant than the introduction of electric typewriters over manuals. ...It's the introduction of a different tool. Bringing in a table saw as opposed to doing it by hand. I don't think it's a quantum leap or anything. ...All this is is a place for
them to get the job done quicker, and faster, and better. It’s not as if we’ve discovered a new answer to problems. (T6, 1985)

Word processing skills were not something that every student needed to have. The school would not necessarily be doing students a disservice by graduating them without computer skills or word processing skills. Instead, the lab would expose students to word processing, and allow students to see for themselves if the word processing tool was useful to them.

Many people graduating from this school never write another letter, or are in the position to hire a secretary who may be skilled in the word processor, but they themselves aren’t. No, I don’t think it’s something that everybody should have, that everybody needs to have, but it can be useful. It’s useful to many people. They should be given the opportunity to discover it and see whether they can make use of it. (T6, 1985)

During the 1985-86 school year, this teacher exposed all his students to word processing in the lab, in a two or three period introductory session. The introductory lessons were designed to ensure that students knew what word processing was and what it could do for them. Students were allowed to use the lab on an individual basis during classtime, and some students used the lab to do assignments outside of classtime.

I ran all my classes through a two or three period Format II workshop and then after that some of them made use of the lab on their own, some of them requested classtime to use the lab for written assignments, and on an individual basis they could. As far as the whole class going it was two or three periods. Just so they all
knew what word processing was and what it could do for them. (T6, 1986)

Personally, this teacher did not use the lab; instead, he continued to use his own PET computer and the PET computers in his room. Some of his English students had learned to use PET computers and these students were able to word process on these computers in his room. He felt, however, that there was little point in attempting to teach most of his students to word process on the two PET computers in his room.

To this teacher, the Aide was a very important part of the lab. Students were supervised in the lab, as well as having someone available to help them, in case of difficulty.

If we lose the Aide, I can see use dropping off considerably just because there is no support for kids when they get into trouble. (T6, 1986)

This teacher saw the integration of the computer into the writing process as a gradual one, which would begin with students using the word processor as an electronic typewriter, and, as they become more proficient, beginning to use the word processor as a planning tool.

Students, once they get past the initial keyboarding process, can use it as an electronic typewriter, and as they get more and more familiar using it as an electronic typewriter, they will begin to see it as more of a planning tool, reorganizing their writing. Anyway, that'll take years, I think. But it will come naturally. (T6, 1986)
This teacher was the only one who, in 1985, had no intention of introducing his students to word processing.

I don't intend to be teaching word processing (T1, 1985)

While this individual had purchased a home computer, this was not the main reason he was considered to be an experienced teacher. This teacher had purchased a Commodore VIC 20 which, he felt, was not a particularly useful machine.

It was a fad. It was a waste of our money. What we'll be doing next is getting a computer as a very practical household budgeting tool. (T1, 1985)

This teacher did make use of a school computer to do his marks, in 1985. This individual had also experienced a computer lab in Ontario. The following quote indicates something of this experience, and may partly explain why he did not intend to teach the use of the computer in his classes.

I taught in Ontario for a good number of years. We had a computer lab there with 35 PETS. It was open in the evening, supervised by a paid teacher. It was open from 5 to 10 pm. Kids could come in and use it. It was never expected that, other than computer science and other specific curriculum courses involved with computers, that kids would use it in class time. (T1, 1986)
This teacher did not feel that teaching the use of computers was part of his job. The first reason given is lack of time.

We have cut major units in literature right out of English 12, no Shakespeare now. ... In Social Studies 11 Advanced, I choose to take my time over simulations rather than give them time to research in class. (T1, 1985)

The second reason was concern about the subjective curriculum that he felt teachers really tried to teach. This perception was also based on his experience of teaching in Ontario.

When I was back in Ontario, about 15 years ago, there was a big push. The educational guru was a man named Megare and it was all on programmed learning and measuring instructional objectives and it got a band wagon going that lasted about a year in Ontario. An awful lot of harm was done in that one year by administrators pushing that everything you did in a classroom had to be measurable. I would argue that in Socials and English, especially, you can't measure the kinds of objectives that teachers really want to deal with in their classes. Nobody has ever found out how to measure the growth of tolerance, the exposure that love is a better force in the world than hate. (T1, 1985)

This individual was also the only teacher to express a concern that using a word processor to correct mistakes might result in a student not learning as much from his mistakes as he might in a more traditional manner.

The easiest way that is still acceptable as far as I know is one line through and you print the correction over top. It seems to me that if
you have typewritten script and you have some typing errors it's faster to do it yourself and understand what you are doing than have the machine do it for you. If the machine does all the rearranging I'm not sure that the memory of the human being really stores away, "hey, that was a mistake and here is how I corrected it and here's where I have corrected it." (T1, 1985)

This teacher's perceptions about computers seemed to undergo very little change during the year that the lab was available. He still regarded the computer as useful for doing marks, as this saved him time. As far as using the computer as a teaching tool in his classroom, however, his perceptions remained very much the same.

It's good to have them in school, but I have no time in my courses, and I'm not a computer teacher. (T1, 1986)

4.2.1.3. T8

This teacher was just completing his first year of teaching when interviewed in June, 1985. At this time he had very little computer background.

I've never been on them enough to even understand what I'm doing. (T8, 1985)

In June, 1985, he was very positive about the possibilities of computer use, both for himself and for his students. He intended to put his marks on the computer because he saw the time that other teachers saved by doing marks this way. He had also seen the benefits of word processing in his students who owned
computers.

During this one English class I have five boys that use word processors. They just had little Commodores or something like that, just small ones, but their writing improved so much when they did their creative writing on the word processor because they could go back and change things around so easily and it was always right there. They weren't going through the labor of writing. (T8, 1985)

This teacher had had a brief opportunity to see a Macintosh computer working with MacPaint and had decided he would like to learn how to use this computer.

In the little in-service at Central. There was about twenty of us and each of us had three or four minutes. We just got to move the mouse around and draw pictures. I could just see the potential there. (T8, 1985)

This individual had decided to take a school Macintosh home for the summer.

By the end of the summer I expect to know MacWrite and MacPaint fairly well. I would like to be competent in both. (T8, 1985)

This teacher expressed no concern about using the Humanities Lab without knowing much about the computers in it. In fact, this individual intended to take advantage of students who knew about computers.

I'll use them [knowledgeable students]. They can teach the class. No, that's great because then if the kids are having problems I can pull out one of these and say, "here, show him how". It takes a load off
me. (T8, 1985)

At the same time, this teacher expressed concern about a situation where the computer could isolate the teacher from the student. As a teacher, he would not like this situation.

I guess you could envision a classroom where every kid is sitting at a word processor or computer and you go from there, but I wouldn't want to teach like that. Too impersonal, something between you and your students all the time. (T8, 1985)

Rather than use the lab a great deal with his students, this teacher intended to introduce the students to the word processor and have his students use the lab mostly on their own time.

In English I can't see spending a lot of in class time on it. I can see spending a few days on them at the beginning of the year, familiarizing the students with the computer lab and the machines we have in there. Then I will expect them to use them as a word processor on their own. (T8, 1985)

By the end of 1986, this teacher was very pleased with the lab. Some of his students had made a great deal of use of the lab. He felt the work these students had done was very impressive. He especially felt that the boys he had taught in his grade 12 Minimum Essentials class had made good progress in learning to write.

The thrill they got out of doing something that looked good was tremendous. They really, really liked doing it. They were in there at
noon hours, they were in after schools, on their own time. They were always begging to go in. They really got into word processing. (T8, 1986)

This teacher spent considerable class time using the lab with his students. With the presence of the aide in the lab he could work with the majority of his class in his classroom, while the students who were actually writing could go to the computer lab.

With her in there the kids could go in there and work, ask her questions, "how do I change the spelling on this word?" or whatever, "how do I print it out?" and she was there to answer questions. I could work with the majority of the class back here. (T8, 1986)

Overall, this teacher was very pleased with the lab and would have been strongly in favor of increasing the size of the lab if money was available. Nevertheless, he felt that the lab was useful in English 12 ME because using the word processor fit into the course curriculum. He did not use the computer in his science class because the curriculum did not offer the opportunity. He thought that supervision could be a problem with some students as well.

A few of the kids in that one [Science 10 Regular] did essays, reports, but it's more a classroom oriented type of thing. There wasn't much of an opportunity, and besides with that particular group of kids I would be afraid to take them close to any kind of equipment, something worth that much. We don't have bunsen burners in the class [laughs]. (T8, 1986)
4.2.1.4. T4

Primarily a teacher of Physical Education, this teacher also teaches some English. In 1985, with very little, if any, experience using computers, this individual was preparing to make computers part of his teaching.

It's going to be a big change for me because I know absolutely nothing about computers. I don't even know how to type, so I'm certainly in a quandary. However, over the past four or five months we have been introduced to a few different things and have been awakened to the fact that they are going to be in the school and that they are quite beneficial, that our students are very adept at use of the computer so it's about time that I caught up to what is happening. I guess I'll be using it primarily in the English area where they are going to be doing a couple of programs on writing. They use it for editing and stuff like that. (T4, 1985)

This teacher was somewhat concerned that it was now his turn to put extra time into learning how to use the computer. Elementary and junior secondary schools had computers available for teachers' classroom use. Now it was to be his turn to learn about computers.

The process of introducing the computers to the school system here in District 59 has been kind of a ... They had them in the junior highs and in the elementaries and they've been sorely neglected in the high school. I don't know whether that's ... I think it was a pretty well planned idea, but now I'm going to be the one that's sort of suffering for it. Now I've got to put all the extra time in. But I really don't mind. It's about time I learned about computers anyway. (T4, 1985)
This teacher felt that he needed to learn how to use computers in his teaching because his students would be familiar with computers. In order to give them the best possible education he would have to use the computer in his classes.

It just proves that I'm computer illiterate. Computer literacy, the connotation to me is that there are generation gaps - that the kids that I'm going to be teaching are going to be computer literate and I'm going to have to stay abreast of them and try to keep up with them and still teach English as I perceive English. In terms of jumping or bridging the gap of teaching English in the traditional manner to teaching English with the computer, I would say that the computer will probably assist me. It will help me an awful lot with the process of writing and reading. It will probably help me an awful lot with the processes of teaching, I think. These are things that I have yet to discover. I'm kind of hopeful. (T4, 1985)

This teacher anticipated going into the new lab in the fall and relying on his students to help with the technical proficiency involved in using the computers. He would be concentrating on teaching students English.

It'll probably be, for the first little while, a mutual learning process. They've already, a lot of the students that we will be getting have already gone through all the stages of becoming computer literate and I'll just be beginning, so I imagine they'll be doing most of the teaching for the first little while, for the computers and I'll be trying to take them through the English aspect, the literature aspect. Hopefully we'll mutually meet there somewhere. (T4, 1985)

This teacher was planning to take a computer home for the summer when interviewed in 1985. When re-interviewed in 1986, this teacher was much less
positive about using computers. He had had a bad experience trying to learn about computers at home the previous summer.

Actually I took a computer home and a program that was supposed to teach me how to operate the computer, but somehow there was a mismatch between the computer, program, and the guide and of course I went home and tried for eight or ten hours to get it to function, and of course it wouldn't function, and so I got thoroughly fed up with it and put it aside and declared myself a non-computer literate person and that's it. (T4, 1986)

During the school year, this teacher occasionally allowed students to go to the lab if they already had experience, but felt he could not take students to the lab because of his lack of understanding. This contrasted with the previous year when he had felt he could rely on some of his knowledgeable students to teach others.

They did get into some word processing. Not the class, individuals in the class who had some background and wanted to use it. The fact that I am totally unaware of what's going on and what's happening has left them sort of stuck in the classroom with me, unless they had some sort of a background and extra time or permission to work in the computer lab. (T4, 1986)

By June, 1986, this teacher felt that he had lagged behind in learning about computers, but he didn't consider the computer in his classroom more than a frill, and hoped that this situation wouldn't change during his teaching career.

So I'll stumble along at my level, whatever that is. But I do foresee that it's going to become essential somewhere along the line.
A lack of a personal interest in learning about computers was the major reason this teacher felt that he would not be learning about computers. He had no plans for taking a computer home for the summer, or in taking any computer courses to improve his knowledge. The only way he could see learning about computers would be a district commitment of time and money to teach him.

I just need time, and when we start talking about time, we are looking at money. I don't foresee it as being something that I'm going to be able to do on my own. (T4, 1986)

In the rest of the results section, the perceptions of the groups described in the foregoing pages will be described in terms of the importance of these perceptions in the use of the humanities computer laboratory. The results have been separated into two major sections, based on the first set of interviews in June, 1885, which discussed teacher perceptions before the advent of the lab, and the second set of interviews in June, 1986, which discussed teacher perceptions one year after the advent of the lab.
4.3. JUNE, 1985 INTERVIEW RESULTS

4.3.1. Use Of Computer Lab For Student Instruction

4.3.1.1. The Importance Of Computer Knowledge To Students

An issue that may have had significance in the implementation of the lab is whether teachers feel computer knowledge is important to students. Two basic groups emerged. Experienced computer users were much less enthusiastic than Naive Users about the possible benefits of computer knowledge to students. The former's perceptions are illustrated by the following three quotes:

No, I don't think it's something that everybody should have, that everybody needs to have. But it can be useful. It's useful for many people. They should be given the opportunity to discover it and see whether they can make use of it. (T5, 1985)

I'm also cynical enough to think that if a kid knows he can write it out in less time than by hand, he is going to allow himself less time. (T12, 1985)

The teacher - student relationship is far more important than any tool. (T1, 1985)

The perceptions of Naive Users, about the need for students to have knowledge of computers, are much more enthusiastic. Naive users’ perceptions, of computer usefulness, are illustrated in the following quotes:

I think it's up to all of us to make certain by the end of the
decade students that graduate from here are all computer literate. They have to be. (T2, 1985)

But the fact that they are getting that kind of education, that they are able to use the facilities, I find that very important. (T4, 1985)

I think it’s going to apply to every subject area in every conceivable way. In the next few years computers won’t be a novelty anymore. (T3, 1985)

Word processing is a priority because it is a function of my job. (T4, 1985)

While the Experienced Users were much less inclined to view the introduction of a humanities computer lab as a panacea for their students, it must be remembered it was these individuals who had been most involved in the decision to open the lab. Naive users, on the other hand, while enthusiastically in favor of a lab, were less sure of specific ways the lab might affect students.

4.3.1.2. Teaching Objectives

A factor influencing the use of the lab was how teachers expected computer use to be integrated with their lessons. The humanities’ teachers had decided to create a word processing lab. Various other uses, suggested as future possibilities, included graphics for mapping, databases for the creation of question banks, and telecommunications to access distant databases. All the teachers interviewed felt the lab was installed for use in word processing, not these future possibilities, as illustrated by the following two examples:
The humanities are interested mainly in word processing. ... You’ll be able to run very sophisticated graphing and recording programs, database and stuff like that, but I won’t be doing that with any of my classes. I’d be using it for word processing. (T6, 1985)

As a word processor. When there is more money available, then I would like to hook into something like INet [an information service] ... That isn’t going to happen immediately. I’m mainly concerned with word processing right now. (T5, 1985)

Teachers can be viewed as two groups, in their perceived expectations of how the word processor might be used by their students. Experienced users felt that they would be confined to having students using the word processor to produce the final essay copies, that is as an electronic typewriter. Time would be a major constraint.

I don’t think there is enough time in some of the courses to be able to fully exploit the capabilities of the word processor. In a grade ten setting, or a twelve M.E. setting, there might be time to play around with that and to get students basic instruction in it, and maybe even work towards doing several compositions on it. Exploring how it can help you in composing not just typing. But I don’t know if that’s going to happen. (T6, 1985)

Some Naive Users were more hopeful about integrating the word processor into the writing process, that is as an aid in editing, proofreading, and re-writing.

I think they [students] recognize that, "Hey, while I still have to obtain the skills to write, I’m getting rid of that onerous job of proofreading, because I can see it all on the screen and see exactly
what I'm going to get." I think it will make writing more pleasurable and I think, if used correctly, will improve students' writing. Now that's what I want to tap into. (T7, 1985)

At the same time, some users were not sure about the mechanics of using word processors in the writing process. When asked about integrating word processing with the writing process, one individual had this to say:

Apparently there is a program out on that. I haven't seen any, so I'm hoping to look at them. Until I see some material on it, I can't say. I don't really know how it would be used or what it would be like. (T8, 1985)

4.3.2. Factors Involved In Teaching About Computer Use

As can be seen from the foregoing section, teaching students how to use computers essentially meant teaching how to use the computer as a word processor. All teachers perceived two factors affecting this process, these factors being curriculum pressures and technical proficiency.

4.3.2.1. Curriculum Pressure(s)

Time limitations, resulting from teaching to the curriculum, was a major factor in determining whether a teacher felt class time was available to instruct students in how to use computers to word process, or how to use word processing to aid the writing process. Academic subject teachers, especially those teaching provincially examinable courses, felt it was unlikely they would use the computer
as a tool in teaching writing, as little classtime was devoted to writing.

I didn’t even finish my English 12, which is a provincially examinable course, or Social Studies 11 Advanced. My kids do all their reading outside of class time. I don’t give them any time in the library, or inclass time to do any research whatsoever. I explain the projects, but they are done outside of classtime. (T1, 1985)

On the other hand, teachers of students in grade ten, or modified courses, felt that some time could be spent teaching how to use the word processor during class time.

For grade twelves, I see it as almost impossible to use class time. Grade elevens, I can squeeze some in. Tens, I’m not too worried about it. I think we can put in enough that they get a good introduction to it. (T5, 1985)

Teachers perceived two ways around the problem of taking class time to teach students how to use the computer as a word processor. The first was to wait until the problem went away or until it was ameliorated by an outside agent. For example, the school’s feeder junior high students had already begun to be exposed to word processing.

I think within two years everyone that comes from Central is going to be computer literate on Bank Street Writer [a word processor]. (P, 1985)

The second possibility was to add word processing to the curriculum of another
I think they are talking about building a short unit of that into Consumer Education, because there is a place where there is some free time and a little flexibility. Then everybody in grade ten goes through it. Just about everybody, so they get the basics there, without interfering with the more academic courses. (T5, 1985)

The foregoing quote implies some teachers anticipated in June, 1985, that the curriculum in many courses would tend to interfere with both the introduction and use of computers. This perception is amplified in the following quotes.

The curriculum is a sit in straight rows, with a pencil and paper, type of curriculum. (T5, 1985)

We have so little time to cover the course, we have cut major units in literature right out of English 12. So no Shakespeare now. (T1, 1985)

There's a time limitation. That will limit. ... A time limitation of courses. We only have 100 days, which is short. (T6, 1985)

Teachers felt that a student's actual use of word processing in writing would be accomplished in the two basic settings of in-class time, and outside of classtime. By June, 1985, some teachers had already noticed improvement in some students' written work when their work was word processed, outside of classtime. With the advent of the lab, some teachers anticipated insisting on some word processed assignments.

Hopefully by the end of September, I will have at least introduced all
my classes to the word processor, so that by the second week in September, I will be assigning an essay and it will be written on a word processor. I am willing to demand that an essay is done on a word processor if there can be time made available for all the kids. (T2, 1985)

The problem of when the students could use computers surfaced. Teachers were concerned that enough time would be available for students to use computers outside of classtime, an especially serious problem for bus students.

I don’t give a lot of in-class time for the actual writing. That’s usually homework and that’s the one area that you see a problem with our timetable. The kids don’t get any spares. It’s just the lunch hour for the bus kids. The in-town kids could come in early or later. (T8, 1985)

4.3.2.2. Technical Proficiency

Aside from curriculum pressures, making it difficult for teachers to find time for teaching students technical proficiency with the computers, teachers were concerned about their own technical proficiency. Initially, then, technical proficiency was a problem faced by Naive Users, when expected to teach a class using a tool with which they were not familiar.

In June, 1985, all teachers, with little knowledge of the computers installed, were faced with the prospect of returning in the fall to teach students in a computer lab. For Experienced Users, the problem was one of learning a new computer system. For Naive Users, the problem was one of becoming familiar
with unfamiliar computer technology. Many teachers proposed to deal with this problem by taking a computer home for the summer of 1985.

I'm taking an Apple //e and a Macintosh home for the summer. (T6, 1985)

While Naive Users expressed interest in word processing for their students, in 1985, only one teacher expressed unease with teaching a class using a word processor, especially in the case where students knew more than the teacher. This individual made the following remarks:

I can stand there and and say, "uh huh, that's fine, go ahead and experiment." Perhaps, with the instruments themselves, they will gain a great deal, but as a teacher, of course I feel just a little insecure in that sense, and I would like at least to be one step ahead, instead of ten steps behind. (T7, 1985)

More typical were remarks to the effect that the teacher saw no problem at all in teaching using word processors, knowing little about word processing, while some students may have considerable knowledge. Typical of such remarks was the following:

There are those moments when you have to admit that you are sometimes not even as competent as some of your students in certain areas. I've had to deal with that all my teaching career. The first time probably it was very threatening. I don't find it threatening any more. (T4, 1985)
4.3.2.3. Teachers Becoming Technically Proficient With Computers

It seems reasonable that technical proficiency comes with computer use. An example of how this might occur is an individual learning to turn the computer on and off. The easiest way to learn this skill would be to simply practice doing it. If most of these teachers felt the computer was useful to their students and to themselves, why hadn’t the Naive Users (7 of 12 teachers interviewed) begun to use the computer before being interviewed in June, 1985?

The author identified five major factors in teachers overcoming their inertia in starting to use computers, including time, availability of appropriate hardware and software, perceived personal need, external pressure to learn, and initial exposure to computers. These factors do not function in isolation; rather, each factor is intertwined with all the other factors.

4.3.2.4. Time

The first factor, which affected the way an individual made use of computers, is time. This factor is the main concern of these teachers when introducing computers to their students. When the needs of the other three conditions were met, however, most teachers seemed willing to invest personal time in learning about computers. The time problem here appeared to be one in which other priorities were more important or more urgent. By way of illustration, one individual said the following:

I’m not interested in doing any programming. If you give me a piece
of software and it's user friendly, it's got easy to follow instructions, then I can use it. Other than that, I'm not interested. (T1, 1985)

4.3.2.5. Availability

Availability of the necessary hardware and software is an important factor in determining whether a teacher will use computers. Before the advent of the humanities computer lab, the only way a teacher in the school could get reliable access to a computer was to purchase one. Five of the teachers interviewed did take this route.

Other teachers, however, did not purchase computers, and, as a result, had not had many opportunities to use computers.

I don't see the computer as a threat because I can recognize the positive aspects of it. ... I don't think I've resisted, I've never really had the opportunity up until now. (T9, 1985)

It is important to note that availability does not mean just having computers in school. The school's computer policy included allowing teachers to take computers home at night, weekends, and holidays. The result of this practice was to make a computer available to any teacher when desired.
4.3.2.6. Perceived Personal Need

Availability itself, however, did not prove to be a large motivator in the learning of computers. Ten teachers, of the twelve interviewed in June, 1985, were regular classroom teachers. Six of these teachers planned to take a computer home for the summer of 1985.

The teachers who were not computer users in June, 1985, and who were planning to learn about computers over the summer, were essentially interested in filling a need as described below:

A couple of kids in the swim club are computer whizzes. I could never even hope to catch up with them. The computer will be a great tool for me, but I will just use it where I need it, whereas they are getting into the programming, and everything that follows along with that. (T8, 1985)

Most teachers were interested in using the computer to help with the mundane, boring parts of teaching. Heading this list was computerized grade-keeping.

In June, 1985, all teachers were either using a marks program, or considering the use of a marks program to make their jobs easier. Naive users were making remarks such as the following:

"Fred Flintstone" has a good program for doing marks. So I want to. Especially after this year, doing them all by hand is a pain. Definitely, I'm going to set mine up in September. (T8, 1985)
I am interested in doing marks. I'd like to find an easier way, instead of a calculator and a pen and pencil. (T11, 1985)

4.3.2.7. External Pressure To Learn

The fourth factor was external pressure to learn about computers. Teachers returning to school in the fall of 1985 were faced with the prospect of a humanities computer lab and the expectation that they would use the lab to teach their students. The lab made computers an issue that directly affected them, perhaps for the first time. Most teachers were reticent about calling computers a threat, but as the following remarks make clear, some Naive Users were certainly perceiving a need to become computer users:

Mine [computer knowledge] is very poor actually. I would like it to be better but I don’t personally feel the crush, the need to do it just yet. I will in the next few months. (T3, 1985)

It has become important to become computer literate no matter who you are. Lots of people are fond of saying, "the computer age is coming," but it is already here. (T8, 1985)

I think it's up to all of us to make certain, by the end of the decade, students that graduate from here are all computer literate. They have to be. ...It's very, very important. You can't ignore it. (T2, 1985)

Other teachers were voicing concerns about how computers might affect their teaching:
Teaching in the area of humanities, I have a fair amount of concern about what I am afraid might be the overuse of computers. ... I've used them [machines] because I felt that there would be times when they would be very useful, but I much prefer a communication on the human level. With other living things. (T9, 1985)

I'm not a worshipper of the computer in any way, shape, or form. Not interested. I want the give and take, and I want the talking. (T1, 1985)

The impending arrival of the humanities computer lab had caused teachers to become aware of computers as a presence that might affect themselves and their work situation.

4.3.2.8. Teacher's Initial Computer Use

The success of a teacher's initial introduction to computer use appears to be a central influence in that teacher's willingness to continue learning about computers. Several teachers found their first experience with computers unsettling. While initial experiences had made some teachers leery of computers, in June, 1985, all were willing to try again, as in the following example.

I sit down at a keyboard or computer, remembering that the first disk I ever stuck into a computer was destroyed. I don't know how, maybe it was defective, but I still feel apprehensive. I have to say, "All right now, go ahead and try it." I haven't got past that stage. (T7, 1985)

Initial computer in-service for these teachers was also an unpleasant experience
for many teachers as the following remarks describe:

I would like to know how word processing works, but it was a fiasco over at Central. We were over there for half a day, and I was at two different machines that broke down. We got a program working and then the machine wouldn't handle the program in it. All kinds of glitches, I'm not very impressed at all. (T1, 1985)

We had a one short session over at Central, and we tried to follow. We were all working individually, but it was fifteen or twenty people trying to get his attention at one time. We were asked to type in a letter and I had no problems typing in a letter. I was waiting for him to come around, and I turned my back to the screen and it was gone. So that was my first introduction to computers. (T11, 1985)

I find it negative in a formal situation because other people are watching. One person teaching you is alright. I felt like a real idiot with people watching. Working at home is preferable. (T9, 1985)

During the year following this first interview, the lab was installed and the teachers interviewed were able to begin using the computers, both personally and in their classrooms.

4.4. JUNE 1986 INTERVIEW RESULTS

After one year, the researcher re-interviewed the teachers affected by the implementation of the humanities' computer lab, to discover if, or how, their perceptions of the lab had changed. Following the initial interviews, in June, 1985, a major change had occurred in fall, 1985, when an aide was hired to
supervise the lab. This individual became responsible for most of the lab supervision, and also taught most students how to use the word processor. The aide's presence freed teachers from being in the lab with their students, and reduced their need to be technically proficient with the computers in order to teach using word processors.

This section will focus on changes in these teachers' perceptions towards the computer lab. As such, the results focus on the Naive Users, many of whom had made substantial progress towards becoming Experienced Users in that they now felt much more confident about computer use. The second interview took place one year after the first, so the researcher has relied on teachers' recall of events occurring between the two interview periods.

4.4.0.1. The Aide

A decision to hire an aide was made in the fall of 1985, and all teachers felt the aide was a useful addition to the lab. The aide was hired to ease the problem of supervising the lab and to facilitate student use of the computers. While some teachers still found themselves, without personal technical proficiency, unable to use the computer lab for teaching students, others found the pressure to be technically proficient in using the lab's computers greatly lessened by the presence of an aide.

We need the aide, we need someone in the computer lab whose knowledge of the machine is better than average. It [the lab] would be used but there would be more time required, spent in the lab
The aide ensures there is someone in the lab who can help the students with their word processing problems both during and outside of classtime. Teachers do not have to be present when students are making use of the facility, which is useful since there is not a class set of computers. Nevertheless, the teacher's utilization of the lab in teaching writing appears to make a difference to the quality of the material students produce.

Teachers who did not accompany students to the lab in its first year of implementation, and who did not teach the use of the word processor as a writing tool, tended to feel that there was little improvement in students' written work. Rather, they felt that the computer was being used as an electronic typewriter.

As soon as they knew how to set margins and upper case and lower case, and stuff like that, they just typed. What they typed from was a copy that already contained all the errors. (T1, 1986)

The aide is teaching them how to use the word processor program, but she is not teaching them English, and they are not on any programs that are improving their English. (T1, 1986)

Teachers who worked to help their students to improve writing skills, using the
word processor, were much more positive about improvements in student writing.

There is more incentive for them to produce, in every sense of the word, a finished product rather than if they were asked to just do it handwritten. Much, much better. (T2, 1986)

The boys would never have gone near a typewriter. They would hand in something barely legible. As it was, they got on the computers and they started getting into drafts, we showed them how to draft and how to plan on it, how to do finished copies and they handed in some really nice work. (T8, 1986)

4.4.0.2. Curriculum Pressure

Teachers perceived that teaching students how to use the computer as a word processor during classtime would soon become less a priority as more students from feeder schools would have learned at least the basic skills involved.

Frank Ross kids are exposed to a six week keyboarding program and Format II, and they should know the basics of how to manipulate the program. Central kids will be exposed to the same. Some of them already have a computer background. But it will probably be in a more formal way next year. We don't anticipate having to teach the kids keyboarding or basic word processing functions. (T6, 1986)

Even so, time constraints, in some courses, were felt to preclude the teaching of writing, using the computer lab. One teacher felt that learning computer use should be a separate course, in which students would gain a detailed understanding of how the computer could be used in various ways to improve
classroom learning. In this way, an English teacher would continue to teach as he or she always had, and the student would learn to apply the computer to this learning in another course.

To make it more useful it has to be taught to every student as a course - The Various Applications Of The Computer - so they are taught how to use it by a teacher who knows what they are doing. So they get taught how to do the word processing and then they just apply our mechanics. (T1, 1986)

By June, 1986, Naive Users had also come to the realization that the curriculum could obstruct classroom computer use. The curriculum, as one teacher perceived it, did not lend itself to the introduction of new ways of learning.

I was quite optimistic. And I think the optimism came from the selling process of the computers. We haven’t made the modifications in the curriculum that will allow us to say, "O.K., this is a fairly big priority - it’s going to be a part of our future in society and all that stuff." I don’t think it’s allowed us to do that, we still have curriculum requirements to meet, and we are teaching the skills and if the skills are not already with the student, we can’t meet those requirements and teach computer skills. (T4, 1986)

Depending on their curriculum and grade level assignments, teachers found that they had to make a decision about the availability of time for exposing students to word processing.

You have to give them classtime. No question about it. This is in grade 11, and some students in grade 12. If they were taking Law, I could afford the time. But with my History 12, I can’t really
afford the time. ... [Because] there is a certain body of work that we have to cover. (T2, 1986)

If finding time for students to use computers during classtime was difficult for some teachers, some students had trouble finding time outside of classtime. An interesting light was cast on this problem by two teachers. These teachers noted that finding the time to work on the computer was difficult for students as well as teachers.

They stuck to their handwriting and working it out that way. ... The computer, I thought, would save them time. A lot of the kids are seeing it as being very time consuming. They say, "Gee, I can't put the time in." (T4, 1986)

4.4.0.3. Technical Proficiency

Experienced users did not appear to have many difficulties transferring their computer knowledge to the Apple //e computer. Of more interest is the experience the Naive Users had in becoming familiar with the technology.

When interviewed in June, 1986, the Naive Users had spread out in a computer experience continuum. At one pole were the Naive Users Central to this study. These teachers had all made progress toward becoming Experienced Users. At the opposite pole were two Naive Users, Peripheral to the study, who described themselves as having made little, if any progress towards becoming Experienced Users.
I don't seem to have had any more time this year than I have had in previous years to do much. I was going to get my marks onto the computer this time. ... I did everything the long way around as I normally do. (T9, 1986)

One measurement of experience was the use the teachers made of computers. None of these users had purchased their own computers. Some of these users had, however, taken advantage of the school's computer takehome policy.

This left shoulder is permanently lower from packing one home. Everything I do is on the Mac. (T8, 1986)

Yet some teachers personally used the computers very little, if at all. Personal use was not the only measurement of experience. All the teachers who had made progress had used the humanities lab with their classes. These teachers made the effort to expose their students to word processing in the humanities lab. In some cases, the lab was integrated into their lessons.

The Apple //e I still don't know how to run. ... I'd get the kids started, get them on the program. The aide was there to help them a lot. With a little editing and stuff I could go around, but I found it released more time for me to concentrate on what they were writing and not how they were writing. (T8, 1986)

Where possible, most teachers ensured that students were exposed to word processing in the lab, either by personally bringing their classes for lessons, or by sending shifts of students from their classes over several days.

With the grade 10's I sent them twelve at a time over three days
and just had basic instruction in there with the Aide. She gave them the basic instruction. They did a set of notes or questions - something from their current work - and that was handed in. (T5, 1986)

I ran all my classes through maybe a two or three period Format II workshop and then after that some of them made use of the lab on their own. Some of them requested classtime to use the lab for written assignments and on an individual basis they could. As far as the whole class going it was two or three periods, just so they knew what word processing was and what it might do for them. (T6, 1986)

This can be contrasted with two teachers who had made very little progress in computer use.

If you are going to use it ... you’ve got to be able to use it yourself as a teacher to instruct the students. As I say, it’s a lack of time again. (T9, 1986)

I would say I’m not giving kids the benefits of learning computers and how to use them for English, or even P. E., but I can’t teach something that I don’t have. (T4, 1986)

The one experienced teacher who did not expose his students to word processing had made this decision, based on a lack of time, before the computer lab was implemented.

There’s no time. In the two courses I taught, I teach Social Studies 11 Advanced and English 12, we did not finish the course, there’s so much material. ... It’s good to have in school, but I have no time in my courses, and I’m not a computer teacher. (T1, 1986)
The major difference appears to be whether an individual has been able to put
the computer into perspective in terms of his own use, and his classroom use of
the computer. One teacher, who used the lab extensively with his students, did
not use the computer for personal tasks due to a lack of typing skills.

I'm waiting for the fifth generation, and from what I have heard
that will be out in 88, maybe 89. It'll be with spoken voice, rather
than typing skills. (T9, 1986)

The degree to which teachers integrated word processing into their lessons
appeared to be directly reflected in the degree to which these teachers felt the
computer was essential to their teaching. One Naive User who, by his own
admission, used the lab the most with his classes, was a teacher in his second
year of teaching.

I think I had them [students] in there more than anybody else. I'm
sure I did. ... I was probably in there twice as much as whoever
was in second. (T8, 1986)

This teacher felt the word processor was very useful in teaching his Modified
English 12 class how to write.

Several of the boys, I bet their letter grades went up as much as
two letter grades. These are the ones that aren't going to go on to
post secondary education and are mainly destined for the trades. (T8,
1986)

This teacher was the only teacher who felt the lab needed to be expanded
beyond the present 14 computers. It seems reasonable that this is a function of the value this individual placed on using the lab in his teaching.

If I was back in this school again, and there was extra money, what I would push for is doubling the size of the lab. (T8, 1986)

Other teachers who used the lab felt the lab was adequate for the present.

At this point it's [more computers] not a priority. Right now I see that the computer lab facilities seem to be doing the job. They seem to be adequate at this time. (T7, 1986)

Most users, who had used the lab, had concluded that the computer lab was a tool that could be used in their classrooms where they could use it when conditions were appropriate.

It's a nice addition. I'm not sure we would have missed it all that much if it hadn't been there. I don't think it's added any great new dimension to our kids learning. (T5, 1986)

4.4.1. Factors Influencing Teachers Personal Use Of The Computer

From all accounts, little computer knowledge was gained from having the computer in the home over the summer. Apparently, using a computer for marks was not perceived to be a pressing need during the summertime. To be a pressing need appears to mean that a task must be of more immediate concern.

I jumped into it in September. I took one home for the summer. I took it out of the box at the end of August. Maybe it was the very
last week of August [laughs], sort of looked at it, plugged it in, and played with MacPaint for about three days, and then it was time for school to start. After that I started. (T8, 1986)

Perceived need explains this apparent contradiction. One Naive User, a Peripheral person in the study, did not feel learning about the computer was something he would be able to do on personal time. He gave an indication that paid learning time would be more effective.

I just need time and when we start looking at time, we are looking at money. I don't foresee it as being something that I'm going to be able to do on my own. (T4, 1986)

By the end of the 1985/86 school year, at least one Naive User had begun to realize the usefulness of becoming personally involved in this way.

... personally, I won't get involved. If I was personally involved outside of the school it would be much easier. The people who are involved are the ones that have one at home and they do their own stuff with it. (T4, 1986)

The school's take home policy was perceived to be very important by two teachers at the end of 1986, who, when interviewed in 1985, had little or no knowledge of computers. As one individual stated:

Taking computers home has been a big help in making computers more comfortable for many teachers. (T7, 1986)

By June, 1986, all but two teachers interviewed were doing marks, or
attempting to convert to doing marks, using the computer.

I'm interested in making use of programs that are useful, the marks program saves me hours of time. (T1, 1986)

I have kept my marks on computer this year, but not using a computer program. I just developed my own for the Format II. It works very nicely for layout, both for marks and attendance. So my marks and attendance have been on the Format II this year. But as far as marks calculation and stuff like that, I find myself doing them just using a calculator. (T7, 1986)

Teachers who did not use the computer to do marks did not do so for two quite different reasons. Two individuals who had not used the computer during the year saw it as a problem of understanding.

I see a lot of people using it - mostly for marks and maintaining marks and it seems to work for them, but they've become computer literate, they've invested the time already. So now everything becomes easier for them. I haven't been able to invest the time, so I'm getting behind the eight ball. (T4, 1986)

The other individual who did not use the computer for marks had decided that the traditional way was just as fast for him. This individual had done some personal research and decided not to computerize his marks. This teacher was not a typist, and this factor may have contributed to his decision.

I can do my marks faster, believe it or not, using the old fashioned method. Although I've had several discussions with other people, my marks go down quite fast. Now, right at the end, when I tabulate all
my marks cumulatively, that would be a little faster that way, but it balances out in that I don’t have to enter each and every set of marks and so, perhaps, I can do it with about an equal amount of time spent. It looks nicer, but it takes up just as much time. (T2, 1986)

4.4.1.1. Initial Introduction To Computers

Initial introduction to computers continued to be important in a teacher’s perception about whether he or she could understand and use computers. One individual, a Peripheral, Naive User, took a computer home during the summer of 1985, and had this to say about his experience:

I took a computer home, and a program that was supposed to teach me how to operate the computer, but somehow there was a mismatch between the computer, program, and the guide. I went home and tried for 8 or 10 hours to get it to function, and of course it wouldn’t function. So I got thoroughly fed up with it, put it aside, and declared myself a non-computer literate person, and that’s it. (T4, 1986)

Another teacher, who had had an unfortunate initial experience with computers the previous year, had persevered. By the end of the 1985/86 school year, this individual had put this initial experience behind him. Using the computer personally, and in teaching, had given him perspective as to how the computer affected himself and his job.

Certainly, I feel more relaxed with them. I took both a Mac and a //e home last summer... Also I am feeling more comfortable in
knowing how this fits in along with other tools. I was rather leery of these, in that before I saw them as something that was supposed to be the be-all and end-all. This was it. This was what we would have to become extremely proficient with; otherwise, we would probably be out of our jobs. Now I see it as just one more tool that makes life just a little easier. (T7, 1986)

4.4.1.2. Ownership

Teachers had no shortage of computers from which to choose with the advent of the humanities lab, as well as the simultaneous establishment of a 30 computer Macintosh lab. The school offered a generous take-home policy for both labs. Most other teachers began to use the Apple //e computers in the humanities lab.

I've been using the //e extensively, using the Format II program. I suppose because that's the first one I've used, I feel more comfortable with it. (T7, 1986)

Teachers who had previously invested in a computer continued to use their own machines for personal use.

I've quit chasing the technology. I'm quite happy with my obsolete stuff at home, it does everything I want it to do. I can't do half the stuff it can do. (T5, 1986)

The main reason that most teachers used the humanities lab may have been the help that was readily available to users of the lab. The help did not come primarily from Experienced Users, as these individuals did not frequent the lab
for their personal use.

I don't use the humanities lab. (T6, 1986)

I use my own all the time at home. I hardly ever use this one [humanities lab], but yes, I think it's being used by staff. (T5, 1986)

The aide was frequently asked for help.

On several occasions I've had to go and check with the aide as to what's happening here. It's a matter of mechanics. (T2, 1986)

Help was also available from other teachers who frequented the Humanities Lab to do an assortment of personal tasks.

"Barney Rubble" helped me, only when we started to do it he was in sort of a learning stage, and it took him longer to find out why the thing wasn't working than the time we had. (T9, 1986)

Some teachers also used the Apple //e's because these were the humanities computers. The one experienced user who used the Humanities Lab personally had previously used a Commodore PET computer, belonging to the school, for marks. A sense of ownership of the lab caused this individual to switch to the humanities' Apple //e computers.

I'm trying to stay with the Apple //e because that is the English/Social Studies lab. (T1, 1986)

One teacher did begin to use the Macintosh in preference to the Apple //e.
I love it. I think that machine is good for everybody, I prefer it to the Apple //e. ... a lot of teachers learned on the //e, and then they see the Mac with the mouse and they don't know what to do. (T8, 1986)

There was also some perception that the Macintosh was a machine for an elite segment of the school population.

The Mac lab, right now, is looked upon as more elitist. You get into that kind if you are really into one of the subject areas that requires computers. We have two subject areas that are really heavily into it. Those are Computing Science and Business Education. (P, 1986)

4.5. SUMMARY OF RESULTS

By the end of the first year of operation, most teachers had adjusted to the lab's presence, in most cases by using it to some extent, but in some cases by ignoring the lab almost completely.

Experienced teachers used the lab much as they had predicted in the June, 1985 interviews. These teachers continued to use computers much as they had previously. Their students were given brief introductions to word processing in some cases, but little classtime was devoted to using the computer as a tool to improve the writing process. The reasons these teachers gave for not using the lab included curriculum pressure, lack of time, and lack of availability of computers. The perceptions of two typical teachers from this group were described at the beginning of this chapter.
Naive teachers fell into two groups in their use of the computer lab. The Peripheral group of Naive Users perceived their attempts to use the computers as a disappointing experience. These individuals, when interviewed in June, 1986, had no intention of continuing to attempt to make use of the lab, although they still felt that an ability to use the computer in their classrooms would be of benefit to their students. One example of an individual from this group was described at the beginning of this chapter.

The Central group of Naive Users was very happy with their experience in using the computer lab. These individuals made the most use of the lab with their students. Individuals from this group were the only ones to seriously attempt using the computers as a method of improving the writing of their students by integrating the word processor into the writing process. This group made extensive use of the aide to circumvent their lack of technical proficiency with word processors. Little mention of the difficulties perceived by the experienced group were mentioned in the June, 1985 interviews by Central, Naive Users, and while these individuals had made extensive use of the lab, none had been concerned by the difficulties perceived by the experienced group.

From a Constructivist Perspective, Chapter 5 will discuss possible reasons for the Experienced Users not using the computer laboratory to teach students the writing process. This group had the most firmly established preconceptions of the lab's potential. One must note that these were also the individuals who had led the movement for a lab, despite voicing the most reservations about the lab's potential for instructional use. Based on interview results, suggestions will be
made for possibilities for instructional use of the lab by these individuals. Reasons why some naive teachers may have been able to overcome their lack of computer knowledge and effectively use the computer lab with their students will also be discussed.
Chapter 5 will discuss the implications of the perceptions of the teachers involved with the implementation of a humanities computer lab, as these implications will influence both current use of this lab and the establishment and use of similar labs in other cases.

Teachers in this study appeared to be guided by their perceptions of what the computer is to them, exemplifying the Constructivist Perspective which states that new learning is guided by previous experiences. Experienced Users continued to use the computer as a personal productivity tool, especially for keeping marks, but did no more than expose their students to the possibilities of the computer as an electronic typewriter, if they went that far. Most Naive Users, on the other hand, began to use the computer laboratory as a tool to improve their students’ writing skills.

This chapter will attempt to provide a rationale, within the Constructivist Perspective, for why some Naive Users moved to using the computer to assist the teaching of the writing process, while the Experienced Users did not. The implications of this phenomenon will be discussed as a possible guide for future implementations of computer labs with similar groups.
5.1. HOW AND WHY EXPERIENCED USERS USED THE LAB

Experienced Users did not take full advantage of the computer laboratory. They extended themselves, at most, to giving, or to having the aide give, a two or three period introduction to the mechanics of word processing. Other than this introductory use, their students were to use the computer lab on their own.

It is the contention of this thesis that Experienced Users relied on previous knowledge of computers to predict their own use of the lab. They foresaw many difficulties, including time constraints and curriculum pressures. The Experienced Users seemed to be limited in realizing the lab's full potential use by their inclinations to predict problems with the lab, based on their previous experiences.

While the argument of this thesis is that Experienced Users did not use the computer lab to its capacity because of the blinders of previous experience, there are some factors illuminated in this study that weaken this central argument. These factors could include lack of technical proficiency with Apple //e's, satisfaction with courses as presently taught, and annoyance with the way the lab was initially implemented. However, enough evidence presented itself, through the interviews, to have the author maintain the central premise that Experienced Users made less use of the new lab as a direct result of previous experiences with other computers.

Teachers in this study did not all teach the same courses. Academic subjects, where curriculum pressure was seen to be a major impediment to use of
innovations, such as a computer lab, were taught mainly by Experienced Users. Some Naive Users taught less academic courses, with less pressure to cover a prescribed curriculum. Interestingly, where both Naive and Experienced teachers taught courses with little curriculum pressure, the Naive Users used the lab more enthusiastically to assist in teaching the writing process.

Teachers in this study perceived that it is difficult, if not impossible, to allow time for student computer use during class time, particularly in more academic courses. This problem becomes especially acute in provincially examinable courses. Teachers of students in less academically oriented courses, where time is more flexible, and who used the lab to help teach the writing process, noticed a greater improvement in the written work of their students. These teachers perceived two reasons for this. The student in a less academic course was given time to spend learning about the computer during class time and that student was likely to be of low academic ability, and therefore possessing less writing ability, to start with. Teachers voiced the opinion that academic students should already be competent writers and less class time is available for computer use, so overall improvement in their work, because of computer use, is not noticed by teachers.

Besides having academic students, some Experienced Users may have had more difficulty seeing ways to integrate word processing with their teaching of the writing process than they were prepared to admit. Until the advent of the computer lab, Experienced Users had only individual computers, mostly in their homes. These computers could not have been very easy to integrate into teaching
the writing process to their students because the Experienced Users seemed to have some difficulty perceiving ways to take advantage of the new reality of a computer lab in the school.

There's no time. ... It's good to have in the school, but I have no time in my courses, and I'm not a computer teacher. (T1, 1986)

There appeared to be little stress for any teachers in telling their students of the availability of a computer lab, where essays can be typed, if desired, either in or out of class time. All teachers affected by the establishment of the humanities computer lab used the lab, at least to this extent. Unfortunately, this minimal participation may not be ideal where a student has little expertise in using the word processor in the writing process. A student using the word processor as an electronic typewriter is likely to produce a neater paper with all the old errors intact, and probably with new errors introduced. Such experiences may reinforce the perceptions amongst teachers that the computer is an easily expendable tool. Experienced Users tended to reflect this opinion, led as they were by previous perceptions.

5.2. WHY NAIVE USERS USED THE LAB

The Naive Users, on the other hand, were initially enthusiastic supporters of the lab, but had little knowledge on which to base their enthusiasm. These individuals attempted to solve their computer problems as the problems arose.

As the Experienced Users made minimal use of the lab, it is reasonable that
new or Naive Users would need to turn to someone else for advice and help in learning about computers.

The aide seemed to have become the expert to whom the Naive Users turned. The aide was always in the lab and had the most experience with the word processing program, Format II. However, for programs other than word processors, such as learning to use a marks program, teachers had to depend on other teachers. Most teachers did find someone to turn to for help in learning to use computers. In many cases, a mutual helping experience may have occurred where as teachers learned something new they helped each other.

The Naive Central Users were more persistent about solving problems that interfered with their use of the computers. These individuals seemed to see the use of the lab as part of their job descriptions, and proceeded to see how the computer could help them in their jobs, both personally and with their students. Peripheral Naive Users were relatively easily defeated by what they saw as problems with technical proficiency, or time.

The Naive Users perceived the computer lab as a classroom tool, set up for them, since this concept had been a major selling plank during the lab's initial implementation. These teachers, guided by the perception of the computer as a classroom tool, began using it as such.

At this point, one might speculate on the implications for how initial computer training for teachers is approached. If a teacher is initially trained to see the
computer as a way of teaching a student a programming language, that teacher may have difficulty seeing the computer as anything but a method of teaching programming. Much of the usefulness of the computer would be lost in such a situation.

An illustration of this situation can be found where Naive Users spent time teaching the writing process using computers while the Experienced Users did not. The time these teachers spent in the lab with their students, as the students did their writing, seemed to make a difference to the quality of work the students handed in. Teachers in general reported that using a word processor was not particularly useful if the computer was used as an electronic typewriter, where a student typed in an essay from a rough copy, then printed it out, without editing or proofreading help from the word processor. It seems reasonable that a computer in itself cannot improve students' writing. However, where the teacher accompanied the students, and spent time showing how the word processor could be used as an aid in the writing process, students' work appears to have improved. In this regard, then, Naive Users took the lead in using the lab to promote the use of the word processor to improve writing skills.

The aide was there to help them a lot. With a little editing and stuff I could go around, but I found it released more time for me to concentrate on what they were writing and not how they were writing. (T8, 1986)

The presence of an aide seemed to have taken the pressure off the teachers to become as technically proficient with the computers as they may have otherwise
needed to be. The aide also ensured that technical proficiency would not be as important a concern to teachers as understanding how to integrate the computer into the writing process. Teachers could rely on the aide to help students with their technical problems. Those teachers who took advantage of this help, by spending more time with their students teaching them to use the word processor as a writing aid, appeared to observe much more improvement in student writing.

On the other hand, teachers who had students optionally use the lab to type essays, on the students' own time, felt these students' work improved only in legibility. An aide, then, appeared to be a very useful addition because technical proficiency became a less urgent teacher concern. To gain maximum advantage from using the lab, however, a person trained in teaching writing seemed to be necessary to enable students to use the word processor to full advantage.

A teacher's understanding of the writing process, not his or her technical proficiency with computers appeared to make the difference to a student's success with using a word processor in the writing process. The ability of the teacher to teach writing, using a word processor as a tool, was not a function of technical proficiency with computers, especially given the presence of an aide to help students with the technical aspects of using a word processor. The physical presence of the teacher in the lab did not appear as important as the time that teacher spent teaching students how to re-write, edit, and proofread.
5.3. YEARS IN THE CLASSROOM

It is interesting that all Experienced Users were teachers with many years of teaching experience, while Naive Users were teachers with from one year to many years in the classroom. One may speculate that experienced teachers have the time and money to explore new technologies on a recreational basis if they so chose, while less experienced colleagues have neither the time nor the money. If this speculation may be applied to computer use, then teacher training institutions need to ensure that new graduates are computer users if they are to efficiently integrate the computer into their teaching upon getting a job. Prior training would ensure that teachers would see computers as one technique in teaching the writing process, rather than these teachers having difficulty using the technology because of previous perceptions about computers.

In spite of the foregoing, less experienced teachers may be more inclined to learn about computers as part of their job. The least experienced teacher in the study was also the teacher who spent the most time using the lab with his students. While this was partly due to the teacher's course load, it may also be partly because this teacher was not as locked into a method of teaching his courses as some of his more experienced colleagues. Instead, this teacher still may have been exploring a variety of techniques and methods in his teaching. An experienced teacher may be less inclined to move to a new teaching technique not perceived as more efficient or convenient than the techniques already employed. Many experienced teachers held the perception that a computer specifically, or any other technological innovation in general, is not as important
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as the teacher. The teachers felt a perogative to teach using the techniques and methods they felt best suited a situation. Experienced Users, then, did not feel the computer lab was any better than teaching techniques presently employed and this perception made it difficult for these individuals to attempt to integrate use of this lab into teaching practice. This conclusion was based on Experienced Users' previous perceptions, not on having actually tried the computer lab as a new classroom tool, against teaching techniques already in place.

I'm not sure we would have missed it all that much if it hadn't been there. I don't think it has added any great new dimension to our kids learning. (T5, 1986)

Experienced Users did not feel computers represented a, "quantum leap", only another tool in their teaching toolbox, and one that could be dispensed with without great hardship. Central to this perception is the thought that the teacher/student relationship is the essential component of teaching and learning, with no tool able to replace this relationship. Teachers are reluctant to change teaching styles when new methods do not appear to offer them a benefit in teaching efficiency or convenience. One may speculate that a teacher who is content with present teaching methodologies may be quite reluctant to disrupt his or her teaching routine in order to try a new and unproved technique, especially a technique with which the teacher may not be as familiar as he or she would like. Indeed it is difficult to imagine why an Experienced User would be anxious to change to a method or technique of teaching writing, which promises as many difficulties as they perceived using the lab to offer. Until students have word processors as easily accessible as the pencil and paper they now use, that is
until transparent computer facilities are available for teaching writing, difficulties with convincing teachers to make word processors a central part of their teaching strategies may persist. This perception may persist even after this if teachers are not convinced that a computer lab will improve their lessons.

5.4. HOW NAIVE USERS LEARNED ABOUT COMPUTERS

The teachers in this study preferred to learn about computers on their own. It is interesting to note, however, that all the teachers who were Experienced Users in interviews in 1985 were very experienced in the classroom. By June, 1986, however, this distinction was less clear cut, as Naive Users became Experienced. Teaching experience was not a significant factor in computer use once all teachers had access to computers.

The acceptance and use of the computer lab by Naive Users points to the changes in perceptions that the presence of computers in a school brings to teachers. One could argue that the increased use amongst Naive Users is a result of a more realistic appraisal of the utility of computers, based on observation and use of the computer lab.

Where the lab was used by Naive Users to support classroom management, as in mark's management, problems such as curriculum pressures and time to become technically proficient were important limitations. Experienced computer Users, in this case, tended to continue to use their own computers, incompatible with the lab's computers, to support classroom management. Thus, Experienced
Users were not as available, to help Naive Users learn, as they might have been if the lab’s computers were compatible with their own equipment previously purchased. Nevertheless, teachers interested in learning about computers were able to do so by taking advantage of the aide, and of colleagues also engaged in the process of learning about computers.

The one teacher who had been so frustrated in his attempts to learn about computers felt it would be very difficult to convince him to learn about, or to use, computers in the future. This individual came away from the experience with the perception that he could not use the computer in his classroom. The other teachers in the study used the lab to become experienced enough with computer use, personally, or in a classroom situation, that they could make decisions, based on personal knowledge, about how they would use these computers.

5.5. SUMMARY

The argument has been presented in this chapter that teachers concerned with the implementation of the lab based their perceptions of this new computer facility on previous knowledge of computer use. Another factor, previous experience, also seems to result in the Experienced User making far less use of the lab than did the Naive User.

While differences in curriculum taught by the teachers in this study weakens this argument somewhat, it is felt the argument is still persuasive. Even where
courses taught were similar for both Experienced Users and Naive Users, Experienced Users used the lab differently with their students than did Naive Users.

This finding has implications in both professional development and pre-service training for teachers. Experienced, computer-using teachers may need to be sensitized to new ways of using computers. Naive, computer using teachers may need assurance that computer facilities are designed for their classroom use, as well as information about how to make a new computer lab work as a tool for them. Pre-service teachers need to learn about computers in a way which will not handicap them in the classroom. Exposing pre-service teachers to computers as classroom tools in the curricula they propose to teach will make it easier for these teachers to use computers as these tools become available.

While an Aide is a valuable addition to a lab, like the computer itself, the aide is no substitute for a teacher who understands how to integrate the various tools at his or her's disposal in teaching the curriculum. The teachers in this study were certainly correct in stating that nothing can supplant the teacher/student relationship. Technological tools will only enhance this relationship when used by the wise teacher.

Ensuring that students are able to use computers as productivity tools for their regular classroom work will prepare students for a world that places increasing emphasis on ability to use computers in this way. This will also ensure that computers are not abandoned by the educational system or studied in school only
as a separate subject.

5.6. RECOMMENDATIONS

1. Enlist support of teachers experienced with computer use if at all possible. Support is more likely if computers compatible with computers teachers already own are purchased. These teachers can then more easily act as resource persons in implementing the computer lab.

2. Ensure that, if a lab is installed to be a word processing lab, or partly as a word processing lab, that English/Social Studies teachers and any others concerned can claim to be a part of the lab. Be sure they feel it is theirs as much as possible.

3. A generous take-home policy seems to be a major impetus in teachers working with computers. A portable computer in a teachers room may make this even more realistic.

4. In-service should explore ways to adapt the computer to the writing process, to ensure that those teachers who are unsure of how to use computers as more than electronic typewriters can pass this information along to their students.

5. Hire an aide if a lab is to be used for word processing. This eases supervision problems and provides help for students when necessary. It is important that teachers continue to provide instruction in the writing process.

6. Care must be taken in introducing teachers to new ways to teach using computers. It must be recognized that integrating computers into the classroom will be a long process as teachers presently must learn largely
by trial and error how to integrate them into lessons. The availability of a lab allows this process to begin.

7. The perception that using computers is voluntary is necessary to avoid turning off teachers, especially if teachers are to train themselves, in their own time, voluntarily.

8. Computers are still not common enough in this school to allow all students enough access that the access can be relied on. Possibly a class set of portable computers, or a computer installed in rooms where teachers are interested in the technology would ease this situation somewhat, especially if an aide cannot be provided in the lab.

9. Do teachers actually teach the writing process, or do teachers simply require a final copy of written work without exploring the process involved in its creation? If students know the process in senior grades then computer dollars should be spent where the process can be taught using computers. When students become seniors they will be familiar with using the computer in the writing process and can effectively use the computer in writing.

10. With less than a class set students may not learn the writing process using computers as effectively because the teacher is less inclined to use the lab. Ensuring that there is a computer for every student in a given class would address this problem.
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APPENDIX 1

Interview Protocol

Part I: Teachers' perceptions of computers relating to teacher personally.

1. Do you see computer technology as similar to other technology that you have used in the classroom?
   a. Have experiences with computers in any other areas predisposed your perceptions?

2. Have you used computers in any way?

3. Some people feel that computer literacy is important as a goal, What is your opinion?

   For example, programming is intrinsically useful in much the same way learning algebra is considered to be intrinsically useful in developing thinking skills. Other people feel computers are important as a tool, for example wordprocessing to improve written work.

   Is it intrinsically important for the teacher to know about computers and/or to know about computers as a tool to achieve other ends, eg. as a teaching aid or as a means of improving record-keeping.

4. What does computer literacy mean to you?
   a. Should teachers be computer literate?
   b. Do you feel a need to be computer literate?

Part II. Teachers Perceptions of Student Needs.

1. What do you perceive as computer literacy to students?
   a. Is the students' need to be computer literate a goal in itself?
1) eg. should programming be a goal of school computer training?
2) Should students be taught about the consequences of increasing computer use in society?

2. Some people think computers, if available, are useful as an adjunct resource in the classroom while others feel computers should be an essential part of learning/teaching today.

a. How do you feel about this?
b. How should computers be used as a learning/teaching aid?

1) Can you give some examples of how?
   a) eg. CAI
      - drill and practice
      - tutor
      - simulation

a. How should computers be used as a tool to improve learning?
b. Can computers, used as tools, be regarded as an adjunct to or an essential part of schooling today?
c. give some examples of how

1) eg. word processing
   a) mathematics - LOGO others
      - where?
      - when?
      - what classes?
      - what ages?
      - what about prerequisite skills - eg. typing skills for word processing?
Part III: What teacher perceives as personally feasible regarding implementation of computers.

1. What are you doing with computers now?
2. What would you like to do with computers in the future?
3. How will you have to adapt your teaching to take into account of the computer lab?
4. How would you like to adapt your teaching to take into account of the computer lab?
5. How would you like to improve your knowledge about the uses of computers?
   - formally eg in-service course programming
     seminar word processing
     informal eg at home spreadsheet
     at school marks manager
     CAI graphics
     software evaluation
     other

6. Do you have priorities for learning about the computer personally?
   a. For example do you have an interest in:
      1) programming?
      2) record keeping?
      3) test banks?
      4) word processing?
      5) telecommunications?
6) other?

7. Do you have priorities for student use of the computer in:
   a) your classroom.
   b) the computer room.
      - programming?
      - word processing?
      - telecommunications?
      - CAI?
      - other?