

AN INVESTIGATION INTO INTEGRATION  
OF THE COMPUTER AS A TOOL  
THROUGHOUT  
THE HIGH SCHOOL CURRICULUM

Practicum

Presented to

Faculty of Graduate Studies and Research  
University of Manitoba

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Education

by

© Diane Angela Lee

August, 1988

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ISBN 0-315-47947-7

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A thesis submitted to the Faculty of Graduate Studies of  
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## ABSTRACT

The purpose of this practicum was to investigate the integration the computer as a tool throughout all subject areas in high school. Emphasis was placed on integrating word processing into the English department, and casually interesting other teachers in computer use.

Easy-to-learn general word processing programs were used with software specific to areas such as typing and geography.

Teachers were encouraged to become familiar with the capabilities of teacher utilities and software specific to their subjects.

Students were co-operative, and enjoyed the experience. In surveys administered, students suggested they would like to use computers regularly within the English program.

The review of literature disclosed a trend toward use of the computer as a tool, in all areas of school. Suggestions for in-service training for teachers are given.

It is recommended that Manitoba educators be prepared and willing to learn to use computers within their disciplines, and that administration be supportive in this effort.

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## Chapter 1: Introduction

In the last ten years, computer use in schools has taken several forms, ranging from computer literacy to computer programming.

First, when schools had smaller inventories of hardware and software, computer literacy courses were introduced. This involved a non-technical study of the computer and its effect upon society, and gave the student some knowledge, tools, and understanding to live in a computer-oriented society (Spencer, 1980). This form of literacy was first taught in high school, then in junior high, and now is introduced at the elementary level. In time, students will likely enter the school system already familiar with computers.

Next, at the high school level, (Grade 10), Computer Awareness 105 was introduced into the curriculum. This course emphasized the study of the involvement of computers in areas such as agriculture, transportation, medicine, etc. It dealt with applications and implications of computers in our lives.

At the high school level, courses were offered in computer science and data processing. The Computer Science 205 and 305 courses have emphasized problem-solving, using a

computer language, usually Basic, and Pascal, with Fortran losing emphasis over the years. Data Processing 202 and 302 were offered, combining programming in Basic, plus workplace applications such as word processing, database, and spreadsheet. A recent revision is this curriculum is intending to remove programming, and feature applications, adding units on graphics, etc. There is a greater supply of software available now to do this.

A additional method of using computers in schools now is to integrate them into areas other than the ones mentioned above. It is the purpose of this study to address this most recent application.

#### RATIONALE:

Integrating computer use across the curriculum will provide broader learning experiences for students. Students who might not otherwise be exposed to computer use (Computer Awareness 105, Computer Science 205 and 305, and Data Processing 202 and 302 are all options) could use computers as a tool, even if only for word processing. It will give teachers an additional, dynamic method of presenting material to their classes. It will promote more and general use of hardware and software, so that school boards will be able to justify costs of equipment.

Curriculum throughout history has reflected society's interest in the granting of a broad general education,

versus the use of education as an instrument of the workforce, preparing future employees. Students tend to reflect their belief in this second function of education in their constant reminder to teachers of the relevance or lack of it, of various school topics - e.g. How will learning iambic tetrameter help me find a job? Because computers are evident in the work force today, students can appreciate their relevance in school, and in the workplace. As Marshall McLuhan suggested, the "medium is the message". He also suggested that we tend to use new technologies like someone driving a car forward while looking into the rear-view mirror (a poor integration of a new and powerful technology).

Teachers are expected to be concerned with professional development. Every attempt should be made to ease them into computer use within their own fields. This type of professional development requires time, but can eventually provide more time-saving for teachers.

School boards are concerned with education, and conscious of being accountable to the taxpayers. They attempt to see tax dollars well spent. Since the late 1970's, they have made substantial commitments to hardware installations. In 10 years, This division has built an inventory of 200 computers for a student base of 6300. Computer labs are costly, per square foot. Cost-benefit gains are desirable. Hardware costs have already been made.

Now, some expenditure on software will make the hardware much more productive. Good software that provides curriculum support is becoming more prevalent. With multi-subject software, menu-driven, a student/teacher can just load a disc into a computer, and produce results. One need not know how to program, just as one can drive a car without knowing how the engine works.

On the concept of integration, a similar experience occurred when schools were outfitted with larger, better-stocked libraries. It took some time to try to integrate library use into many different subject areas. Without effort, the library can be left in expensive isolation. This should not happen, with libraries, or with computer equipment.

GOAL:

To integrate the use of the school computer equipment into a variety of subject areas previously not making use of the computer as a tool.

To acquaint students with an integrated use of the computer within their regular subject timeslots.

To acquaint teachers with the variety of computer use available, and the ease of its use within their own usual teaching programs.

Specific applications within the school:

1. As a communication tool for the student council.
2. As a marketing tool for the yearbook committee.
3. As a communication tool for the school musical.
4. As a graphic arts tool for all teachers.
5. As an information-handling tool for the library.
6. As an enrichment tool for the Geography department.
7. As a teaching tool and diagnostic aid for the Typing classes.
8. As a production tool for the silkscreen area of the Art department.
9. As a means of integrating computer use into the English department to create - Electronic English!

SETTING:

At present, St. Boniface S.D.#4 has approximately 6300 students, and 200 computers. This stage has been reached since the mid 1970's along the following path:

- 1978: Pierre Radisson Collegiate received 5 Pet computers to establish a vocational Data Processing course.
- 1980: J.H. Bruns, and Windsor Park Collegiate, the other two English high schools, started business education programs with 8 Pets each.

- 1981: A committee was struck in the division for purposes of establishing guidelines for computer implementation within the divisional schools.
- 1982: Change in superintendents - plans put on hold.
- 1983: Rene Bosc, Principal of Louis Riel, becomes a full-time computer co-ordinator for the division. This position remains for two years.
- 1984: The areas of special education, guidance, and resource begin purchasing software for their needs.
- 1984-86: Schools are given some monies to purchase software. They also begin their own software purchase programs.
- 1985: All high schools in the division are outfitted with a 14-unit Apple2E computer lab. There is a travelling lab set up with 16 TRS80's and computer awareness programs are set up for Grades 7-9's.

Equipment at practicum sites:

1 School I - the Data Pro lab is equipped with Commodore Pets - older models not supporting much software. The Apple2E lab is here, with two printers, and double disc drives for each machine. The Special Education department has four of their own Apple2E's, and the Foods vocational program has their own Apple2E and subject-related software.

2 School II - (the following year) There is a Data Pro lab equipped with Commodore Pets moved from another school that has upgraded to IBM PC compatibles. There is also an Apple2E lab, with 17 microcomputers, 3 printers, and double disc drives for each machine. There is also a modem.

DESIGN:

Hardware used:

Apple2E lab (both sites: School I (1986-1987), School II (1987-1988))

Software used:

Note: In all instances, emphasis was not on software that was remarkable and could do many things. Instead, emphasis was on using software that was simple to use. Emphasis was also not on a wide variety of software, differing with each course. Where possible, software with a wide range of applications was used. Traditionally, software was categorized into types, although now software exists that blurs those former distinctions.

Software used:

1. As a communication tool for the student council:

Printshop

Printmaster

This tool-type software produces page-sized small posters, large banners, cards, and letterheads. They are used to promote events going on in the school.

2. As a marketing tool for the yearbook committee:

Printshop

Printmaster

Multiscribe

This tool-type software can be used to make demo ads for potential yearbook advertisers. Selling ads is easier when a sample can be used as a selling feature. (Other programs that are really specific desktop publishing software, now very popular, can be used, but they require more learning time by the user.)

3. As a communication tool for the school musical:

Printshop

Printmaster

Multiscribe

Certificate Maker

The art department, supporting the musical, uses these programs to produce silkscreen stencils, from which posters are created. In-school posters are also made, right from the computer. The last program mentioned is useful for the musical director as a motivator for cast members during the 'dog days' of the rehearsal schedule.

4. As a general graphic arts tool for all teachers:

The same programs mentioned above can answer individual teacher needs. Teachers are invited to sit in on the use of the software so that they can see how easily it is used. They appreciate its use for making title pages, unit headings, and graphics that can be converted into transparencies for the overhead via the xerox and thermofax machines.

5. As an information-handling tool for the library:

The Librarian

Appleworks

Both these programs (the first exclusively, the second in its database section) can produce bibliography files. This capability can be used well in almost any subject area. Computer card catalogues are possible, but not yet in place in most schools. Appleworks can also be used to 'capture' information when a modem is used with external databases.

6. As an enrichment tool for the Geography department:

Fort Walsh

Up the Creek

Diary of Black River

World Geography - Canada

Where in the World is Carmen Sandiego?

These simulations are especially interesting. The first four are produced by MCALC, a Manitoba-based software

development group, and are available cheaply to Manitobans.

They resemble the very popular Oregon Trail simulation program that follows 'settlers' in the U.S.

Carmen Sandiego is so popular that it now exists in spin-off locations (Asia, the U.S.).

7. As a teaching tool and diagnostic aid for typing:

Mastertype

Typing Tutor II

The first of these programs is a combination tutorial and game. It is an entertaining way to improve speed and accuracy in typing. The second program provides very personalized feedback that assesses a student's typing speed and style, to a degree that no regular typing class could duplicate.

8. As a production tool in silkscreening for the Art department:

Printshop

Printmaster

Multiscribe

In the production of silkscreen stencils, there are limitations: silkscreen film is costly, and must be painstakingly cut with exacto knives. Fancy lettering becomes very time-consuming, not cost or time-effective. Letraset is too costly. A photosensitive stencil is superior, and can easily be produced using the fancy print

capabilities of the programs above. The computer print is transferred to a xerox print, then a thermofax print, and finally to a photosensitive light exposure.

9. As a means of Electronic English for the English department:

Mastertype

Bankstreetwriter

Multiscribe

Newsroom

Students are able to use these programs to integrate computer use into their regular English course. This part of the practicum was most structured, and long-term. At Site 1, the experiment continued for 3 months. At Site 2, it was integrated for the whole year. Students spent some time learning keyboarding, then word processing, and some desktop publishing.

In attempting to integrate computer use throughout the school, by the nature of my teaching load, and its variety, much of the integration was still linked to my efforts. As much as possible, attempts were made to encourage teachers to become familiar with the hardware and software, and to initiate their own use of it, rather than asking the 'person who knows' to do it for them.

Generally, this is how the experiment became structured:

- check own timetable against others to see where spares match classes for others, and computer space is available.
- from availabilities, target some areas, either by software suitability, teacher interest, class size, etc.
- informally speak to teachers interested in the experiment (not giving the impression that you are about to add to their current tasks).
- set up timetables for class involvement.
- encourage teachers to participate in the planning and execution of assignments using the computer lab.
- if teachers are hesitant at first, bring them in as the class progresses, when things look easier.
- invite teachers to work along with students, using the software.
- if all goes well, the subject teachers should become the directors, with the initiator becoming a 'lab assistant'.

SIGNIFICANCE:

1. To show that the computer-as-tool can be practical, and possible within a school in various courses, and using a

computer lab that is not fully booked by the computer department.

2. To implement the evolved use of the computer as a tool within the curriculum.

3. To satisfy the accountability interests of administration, with respect to expenditures on computer labs and software.

LIMITATIONS:

1. Timetable: Hours and classes were selected by matching my spares to other teachers' classes.

2. Human resources: The level of desired involvement of both teachers and students could not be guaranteed, as they were not initiators of the project.

3. Hardware and software: Printers were in short supply, relative to computers, thus causing delays. At times, class sizes were too big to use the lab well. Ideally, one student per machine is best. Good software is critical, and available, but not always within a school's or department's budget.

## Chapter 2: Review of Literature

Shane (1983) suggests that:

...the so-called information revolution, driven by rapid advances in communication and computer technology, is profoundly affecting American education. It is changing the nature of what needs to be learned, who needs to learn it, who will provide it, and how it will be provided and paid for. (p.126)

Curriculum is changing. Computer integration can be justified in consideration of several curriculum theorists. Dewey(1902) suggested that the ideal aim of education should be self-control, in keeping with the individualization (implying self-control) that is commonly associated with using computer programs in class. Dwyer (Taylor, 1980) concurs, seeing education as liberating human potential, thus the person. Dwyer further says that:

A curriculum is a structure that brings about and nurtures two kinds of growth in students: growth in repertoire through assimilation of (and practice with) good ideas from the past, and growth in creativity through developing a habit of creative problem-solving. (p.106)

He feels computer use supports this curriculum. The rational curriculum theory espoused by Tyler in the 1950's, with its strict breakdown of objectives, learning situations, and evaluation to judge the meeting of those objectives can also be applied to the integration of computer use across the curriculum. If the objective is to promote use, activities practice use, and observation suggests mastery, Tyler's curriculum theory is suitable. Becker(1985) reports that "schools are becoming serious about trying to use computers to reach important learning objectives". Smith (1982) feels that Tyler's structure is not enough, suggesting that "a representaion of knowledge is more important for curriculum development than a list of behaviors". He feels that a "list structure" is not as useful as a "complex network of related topics". Jerome Bruner (Taylor, 1980), an early proponent of 'hands-on' education would be pleased by today's computer capabilities:

The acquisition of knowledge, be it the recognition of a pattern, the attainment of a concept, the solution of a problem, or the development of a scientific theory, is an active process. The individual ... should be regarded as an active participant in the knowledge getting process. (p. 59)

Just as Sesame Street revolutionized education by making it interactive via television, the computer has made classroom learning much more interactive. It is this activity that Bruner stresses, and computers provide.

Although it took a hundred years to shift from the agricultural to the industrial age, in a mere twenty years we have moved to yet another age - the information age (Naisbitt, 1982). If there can yet be any doubt about the import of the computer, please note some of the superlatives used to describe it:

Nobody really needs convincing these days that the computer is an innovation of more than ordinary magnitude, a one-in-several centuries innovation and not a one-in-a-century innovation ...an event of major magnitude (Simon,1983)

Or, relative to education, Thomas Dwyer(1980) says: "computing is so compelling a tool that it cannot be stopped", and "...can be an agent for catalyzing educational accomplishment of a kind that is without precedent", and "...there has simply been no other tool like it in the history of education."(p. 113)

In some ways, we have been overcome by the technology of this new age. It has been suggested that a parallel exists between computer use now, and the Gutenberg press in

1492 in Germany (Taylor,1980). At that time, books became available to the masses, but they were largely illiterate, and unable to enjoy the new technology. Today we have too many computer illiterates who have not yet integrated computer use into their lives. Education must join business in making this possible. Ediger(1988) points out this connection when saying "computers are utilized in the business world and in society in general in a very comprehensive way. School and society must not be separated". Calvin(1979) earlier stated more forcefully the school's responsibility to join this new age:

...changes in communication technology are occurring at a rate which makes it imperative that our schools begin to teach and function in the present...if they continue to teach about 'how it was when I was in school'... meaningful education becomes more and more a function of agencies outside the school.(p.29)

It was estimated that by 1985, 75% of jobs will have some computer involvement (Naisbitt,1982). The minimally-educated child will have to be familiar with keypads, printouts, and databases (Damarin, 1982).

Teachers will be encouraged to participate in this move toward computer use. In some areas, it is not only encouragement; instead, it is a requirement. Bruder (1988)

reports that " as of July 1, 1988 all pre-service teachers in that state °California§ must complete a fifth year of coursework in computer education before they can receive a 'clear', or permanent, teaching credential...regardless of discipline." It can be noted that this computer training "gets into the various applications of sophisticated software for classroom use". Not only in California is this the case. "Beginning in 1988, all certification institutions must make it possible for education students to become computer literate in their discipline" (Electronic Learning,7(2)). Flemister(1988) points out that there is a shortage of teachers who understand both their regular subjects and computers, and therefore would have trouble integrating their use.

Judd (1983) gives a frightening scenario of what may happen to teachers who choose not to include computer integration into their teaching:

...should you decide to bury your head in the sand and not participate in the computer revolution... the world may pass you by - as it did school administrators who decided not to include driver training and teachers who sought to ban calculators...the second outcome...you may be sued for incompetence. As computer curricula become more effective, teachers who do not use computers will become less effective than those who do. (p. 120)

Bruner (Taylor, 1980) recalled teaching fifth grade as a refresher from his Harvard duties, and being overwhelmed by the amount of work the teacher did. He wondered how a teacher could cope without some kind of "supporting backup" that Thomas Dwyer suggests could be the computer.

Many innovations don't get very far because they are cost-prohibitive. Although computers are costly, they have become less so. Jennings and Cornish (1980) suggest :

In a decade, CAI will be three times as productive at one half the cost. I know of no one who has developed a system for making human teachers three times as effective at half the cost in ten years.

Arthur Luehrmann (Taylor, 1980) refers to a 1977 Time magazine article suggesting that every home will be able to have a computer, and that it will be as standard as a toilet. Patrick Suppes (Taylor, 1980) sees computers as cost-savers because they will be able to increase the productivity of faculty in the face of declining budgets.

Once the concept of using the computer in schools has been accepted, how it is to be used becomes important. To use the computer as a tool it need only have some useful capability programmed into it such as statistical analysis, super calculation or word processing. Educators like Suppes, Bork, Dwyer, Luehrmann and Papert "all assume heavy use must be made in education of tool mode

computing".(Taylor,1980) Diversity of course offerings, and individualization of learning are aided by this integration. Luehrmann believes that, unfortunately, "few courses at any educational level show students how to use computing as an intellectual tool with applications to the subject matter being taught". (Taylor, 1980) White (1983) acknowledges a trend in the growth of the idea that the computer should be used as a tool. Caissey (1986) notes that educators are beginning to realize that if computers are to become integrated, and not just relegated to certain and special classes, they must find a useful and comfortable place in the ordinary classroom. In the Educational Technology 1987 Survey of the States (Electronic Learning, 7(2)), the recommendation was made that computers be integrated into the curriculum as an instructional tool, "an invisible medium for all subject areas and grade levels. We stress word processing, problem-solving, critical thinking, simulations, CAI, and interactive processes", and noting that integration "is becoming a standard practice within the schools". To use the computer successfully as a tool, students would be able to:

- 1....get information in the social sciences from a large database enquiry system
2. simulate an ecological system
3. solve problems by using algorithms
4. acquire laboratory data and analyze it

5. represent textual information for editing and analysis
6. represent musical information for analysis
7. create and process graphical information, etc.

(Taylor, 1980)

Computers can and should be integrated into the curriculum. The need has already been established, but not yet satisfied. Unfortunately, there are obstacles. Teachers are not adequately trained (Diem, 1982). Moursund (1979) says further:

...barriers to progress..two categories...Into one category we put things like hardware, software and courseware...into the other category we put those barriers that depend upon knowledge of the individual teacher or school administrator. And it is here that we find the major and continuing bottleneck. Without knowledgeable teachers and supportive administrators, progress will be painfully slow. (p. 39)

Teachers are often not even aware of what is available in the form of word processors, test creators, gradebooks and worksheet generators (Simon, 1988) that could help them with their time demands.

Teachers have problems about approaching computer use. Some of it is fear (Caissey, 1986) of the technology.

Studies by Stevens(1982), Holmes(1982),Judd(1983),Dennis and Kansky(1984) bear this out (Flemister,1988). This fear affects their ability to consider the advantages of computer use in that "very few teachers thought about the impact computers would have on students and even fewer thought about the possibility of using computers..."(Bracey,1988). Stevens(1980 and 1982) reports on a survey of Nebraska educators at all levels, replicated after two years. In both studies, there was a believed lack of expertise on the teachers' part, but a desire to learn which was more pronounced when the survey was repeated. Surprisingly, of the three groups studied ( K-12 teachers, Teachers College faculty, and student teachers), the student teacher sub-group was the most conservative:

They were less inclined to see the advantages of computers, exhibited more anxiety, felt less qualified and less enthusiastic about the inclusion of instructional computing courses in teacher training programs than the teacher or teacher educator sub-groups. p. 14

Honeyman(1987) suggests that anxiety over computer use lowers over time, and depends upon previous experience. He cautions against in-services with too little time on the computer for beginners.

Why are teachers so resistant to change? Can it be as Papert has said (1980) that we have the tendency to use old

instructional methods with new technologies? Lumsden observed that:

Spicer(1952) has observed three different conditions under which people predictably resist change. (a) when the proposed change is not yet understood, (b) when the change being advocated appears to threaten basic securities, (c) when the proposed change is perceived as being imposed. p.53

Teacher attitudes need to be changed. How? Loyd & Gressard (1984) pointed out that becoming computer literate "does not occur overnight nor does it occur in the presence of hostile or aggressive thoughts toward the technology". Fersko-Weis(1985) adds that "the most important thing is to be convinced personal computing is worth learning to use and be prepared to put up with the annoyance and inefficiency of learning a new tool". Fullan (1982) feels that teachers, before making any changes, will ask: 1. Does it serve a need?, 2. How clear is the change in terms of what the teacher must do?, and 3. How will it affect the teacher personally in terms of time, energy, new skill, sense of excitement and competence, and interference with existing priorities? Madsden (1987) feels that proper In-Service training both improves attitudes and teachers' knowledge about computers. In order to interest teachers in becoming computer users, it was found that it was most important to

give them guaranteed access to computers. Less valuable were perks like salary credit, release time from classes, or commendations and publicity (Stasz,1985). Another article suggests a variety of approaches for In-Service programs:

- attract the teachers with utilities, using software like Appleworks, Gradebook

- employ a school-based management system where everyone works together to think about how technology can be used

- start attracting teachers...using media specialists for basic computer literacy (Electronic Learning,7(1)).

As teachers become more computer literate, they can decide better which software to use. Generally, they look for bug-free performance, good documentation, and ease of use. With greater comfort, they also consider how it would maintain student interest, and educational value (Callison,1978).

How is this integration to take place successfully? There seem to be problems other than hardware, software, and teacher attitudes. Frey(1988) describes the difficulties of computer integration in a foreign setting, in Germany, where the debate centered on whether to integrate computer use into all subject areas gradually, or to make it a separate area of its own. Because course times are jealously protected there, a compromise was made: a block of pure computer instruction, followed by integration into the various disciplines. Flemister(1988) points out that

"Dennis(1979) believed that inservice training structured around workshops or extramural courses lacked both the intensity and duration to guarantee the establishment of new classroom habits for computer-using teachers." The time constraints and busy workday of teachers was also noted (Hunter,1983). Cross(1980) suggested that adults are rather special learners, who are pragmatic, wanting to learn how to do something, and to learn it in an active way. He also notes that the academic world is discipline oriented, with some departments naturally being more interested in technology than others.

When planning for integration Baum (Flemister(1988)) in 1978 identified a set of 30 skills needed by computer-using teachers. These skills suggest someone who is comfortable with the hardware, software, courseware, software design types, equipment maintenance, making intelligent computer-related purchases, and integration of computerware with courseware. The skills were gathered via the Policy Delphi technique being applied to active computer-using teachers and university academic experts.

To create this type of computer-using educator, several models have been offered so that integration really would occur. Preskill(1988) suggests a model from Minnesota that " is based on extensive research in the area of effective staff development practices and adult learning". The

training model, with steps that build on each other, includes:

- implementation planning (priorities, expectations, goals, roles)
- teacher preparation (video, discussion)
- product training (hands-on)
- integration

By integration, he means " when teachers make reasonable decisions about matching the microcomputer and available courseware to the instructional goals, the structure of the subject matter, the nature of the students, and the context of instruction".

Teachers have some point to make about successful integration. Flemister (1988) surveyed teachers and found training "should be conducted at the school, during inservice days, as an initial session with periodical followups, and should be organized by grade level and subject matter". Stasz and Shavelson in 1985 found teachers wanted "...teacher-taught, individualized, multi-session workshops, with 'hands-on' practice, follow-up, and incentives for participation".

Diem (1981) and Stasz and Shavelson (1985) agreed on several considerations in the adoption and implementation of a computer staff development program:

1. selecting and evaluating software
2. allowing hands-on experience

3. integrating the computer into the curriculum
4. an ongoing computer staff development program

School Tech News in Jan/Feb of 1987 referred to a study by two Pepperdine University professors after an IBM Model Schools Program finished in 59 high schools in California. They felt that for successful implementation of computers (read integration) they found 10 critical success factors. These were:

1. The assignment of a full-time lab assistant.
2. Support from the principal.(also Hill, et al,1988)
3. Department heads trained in the use of computers.
4. One key "mover and shaker" in the school.
5. A "critical mass" of computers.
6. An "open access" to computers policy for the computing faculty.
7. Identification and use of funding sources.
8. Commitment to a multi-year effort.
9. Teachers have their own computers at home.
10. Computers located adjacent to learning areas.

Some previously unmentioned, but practical items appear in their list: a lab assistant to maintain equipment and room use, the idea of 'key' people being there as role models, and teachers having computers at home because it is felt that they would then prepare materials for school use which they can't find time for during the day. They suggest that

even a year is too short for significant change, or continuity.

Several articles report on ordinary, and interesting applications that are being done. McCarthy (1988) points out that "classroom computer usage is moving away from 'neat computer experiences' and toward the use of the computer as a tool to supplement the existing curriculum". There are novel uses. Barbour(1988) describes a project whereby math students go to a local town cemetery and gather data that are then worked into a database, and have statistics performed on them with such programs. Keyser(1979) describes the use of PILOT, an authoring language that aids teachers in making tests. Grabe and Dosmann(1988) point out the value of adventure games formats that can be used in schools, by virtue of their requirement that the student read material, engage in self-directed thinking and problem solving, and be active. As a reading aid they feel these games have great value, promoting "cognitive skills important to purposeful reading and study behavior...a reading task with immediate and self-contained consequences for successful reading behavior". They do point out that existing commercial games have problems: sparse text, too many pictures, problem-solving emphasized more than reading, little assistance that frustrates players, commands not easily remembered or displayed, and the need to keep records and maps on paper to keep from being disoriented.

Chan & Whelan(1988) describe the computerization of the Swift Current Comprehensive High School library, and its resultant cost benefits, plus others like " new fast ways of researching the literature via online Grolier databases for approx. \$300.00 per year, and Infoglobe from Toronto " which "clearly have a unique ability to attract students to our library". (Note: bases like this are available in Manitoba through the Minet account system, on a Level 2 account, for about \$400.00 per year.) MacPherson(1988) describes how the Envoy 100 electronic messaging system has aided Nova Scotia schools that are often isolated, being an "exciting, inexpensive, and enormously powerful tool for improving the delivery of school programs to students".

Perhaps the major type of integration in place so far is in the field of word processing. Sharples(1983) describes the British Open University experience in using wordprocessing to aid the writing process, seen as having three stages: concept formation, text production, and text revision. They make use of programs that feature sentence generation, story planning, text transforming, and thesaurus tools. Hennings(1983) promotes its use by saying "an educator who has used a microcomputer with word processing capabilities quickly realizes the potential of word processors in school writing programs". She points out how wordprocessing sells itself, once people are exposed to it. Feeley et al(1985) emphasizes ease and interest with

"word processing, utility packages, and filing systems are all tool applications ...can make the teachers' and students' work easier and more interesting", while allowing teachers are "overworked ...trying to teach reading and writing in whole language contexts...therefore see no place for a drill-and-practice use of the computer". Barker(1985) is even more positive: "...probably word processing will have the deepest long-term impact...as a planning, composing, revising and printing tool, it seems to change the way people approach writing". Word processing is also favored when priorities for use are considered. Becker (1985) says:" high schools should concentrate on one or two applications...too many schools are trying to do too many things...'If I were a high school principal,'Becker said,'one of the areas I would consider for a concentrated effort is word processing'...Schools should begin teaching keyboarding in the 4th grade... should not teach word processing as an end in itself...but as a way to improve composition (and other language arts) in conjunction with the English department".

Just as some integration and computer use has already been observed, studies on its effectiveness have also appeared. McCarthy(1988) reports that all grade levels, when using word processing "wrote longer and more complexly...fewer grammatical and spelling mistakes". Sharples((1983) commenting on the Open University

experience, found that "the course required some prior ability from the children to view language as an object for experiment and revision". In a small sample tested, those with initial skills profited most from the writing experience, and the poorer students were only motivated by games and programs that simply revived their interest in creative writing. Dalton and Watson (1986) reported that for 7th grade students, with high and low skills, the low achievers benefited more, relative to conventional study than the high-ability students. Reasons offered were keyboarding problems, and problems in accessing the micros. Dalton and Hannafin(1987) offered more support to this idea that the low achievers benefited more than the high achievers. Barker(1987) presents the most exhaustive results and references on word processing use. Some of the observations are:

...surveys have been done (Bridwell & Duin,1985; Bridwell, Nancarrow & Ross,1984; Hawisher,1986; Haring-Smith,1986; Roderigues & Roderigues,in press)...quality of the design of the research study is an almost universal concern °too non-standardized§. ...almost all researchers ...note...using a word processor improves writers' attitudes. ...initial planning(before starting to write) and evaluative planning(rereading)...is reduced.

...writing amount§ more words, but sometimes less fluent...due to not user-friendly programs.  
 ...writers try to shape the machine's capabilities to their own ends, with more or less success.  
 ...revising...variable results... but revising occurred immediately, not requiring between-draft revisions .  
 ...changes in motivation, time spent on task, willingness to share writing, and willingness to revise freely.

On the less positive side, Barker also points out that researchers have noted a detrimental effect on revising habits due to screen size, and other screen factors.

...spacial recall(the ability to find information on a screen...information retrieval(the ability to get information out of read material...overall comprehension...were significantly decreased among writers reading conventional computer screens(24x80) as opposed to writers reading hard copy. p. 118

In a more general sense, Bracey (1987) reports that researchers are "currently getting positive results in 85-95% of their studies". Samson et al(1986) note that computer-based instruction programs produce, on average, small but significant improvement in students' scores on achievement tests. Drill and practice was less effective than tutoring programs at the high school level. Larger

effects were noticed for black students and inner-city students, and for relatively lower and higher achievers, in contrast to those of average achievement [not in agreement with the wordpro surveys, generally].

Although positive results surveyed may not appear to be too dramatic, there is some optimism. Hill et al(1988) refer to integration by suggesting the curriculum will incorporate a rich and safe environment where communication will be stressed and encouraged. Thinking and problem-solving will be the focus of all curriculum areas. The computer will be an integrated part of this curriculum and will act as a facilitator.(p.47)

Walker(1983) discussed the potential and limitations of computers, and even though his comments are only five years old, some seem dated. He says the potential is for more active learning, with less mental drudgery, individually tailored, with more aids to abstraction, and the capability of learning nearer the speed of thought he was the only one to mention this last point. . When discussing the limitations, he worries that they may try to substitute for education. He says microcomputers are difficult to use. He feels teachers prepared to use them are in short supply. He says new products arrive too quickly to make good future planning. He says good programs are scarce. McCarthy(1988) reports that computer co-ordinators, voting on their favorite software, named Appleworks, Publish It and Reader

Rabbit as favorites. Classroom Computer Learning, in February 1987 picked the top six of that year and they were: Bankstreet School Filer, Biofeedback Microlab, Geometric presupposer Point and Lines and Quadrilaterals, Logowriter, Microzine, and Touch 'n Write Penmanship. Walker also suggests it is difficult to teach humanities with computers. Computer use is increasing. In 1981-82 only 18.2% of all public schools [U.S.] used micros, compared to 95.6% in 1987. A 1986-87 similar study done in Manitoba by the Educational Technology Program showed that in 1980-81 18% of schools were using computers, and in 1986-87 95% were using them. There were over 7000 computers in place by 1987, up from several hundred in 1980.

Becker(1985), referring to a 1985 U.S. national survey, gets the last word:

An increasing proportion of elementary, middle and high school teachers were coming to believe that the best way to use computers at their school was as a tool to help students accomplish concrete tasks - tasks in writing, problem-solving, data analysis, and perhaps other areas. A similar change in emphasis was occurring during this period in the professional literature on educational computing Favoring 'tool uses' ...was becoming more significant. p.10.

### Chapter 3: Methodology

Two approaches were used to introduce students and teachers to the possibilities of computer integration: one casual, one structured.

Informally, teachers, student council, the yearbook committee, and the musical director were all approached with the intention of creating an awareness of the computer software available for integration in their areas. Every effort was made to encourage them to try to use the software themselves, with some coaching. Many of their requests were on an ad hoc basis, so they preferred the computer work to be done for them, and they would gratefully accept the end product. This reluctance to "get one's hands dirty" was to be expected, and was not challenged. Exposure to computer capabilities was the main objective. It has been said, in comparing the relative successes of advertising versus education, that advertising attempts to make small changes in large numbers of people (e.g. cigarette brand switching) whereas education attempts to make large changes in small numbers of people (educate with new ideas). This casual computer experience could be considered advertising!

Accompanying samples of computer-produced items will explain this casual use:(Illustrations available at end of chapter)

1/ When the student council was producing a fashion show, posters and programs were needed. The show producers helped in making the Newsroom program, and Printshop posters. The student in charge had been a former computer student of mine, so she had some experience, and was dedicated when learning new software.

Illustrations: 2-4

2/ When members of the yearbook committee went into community businesses to try to sell ads for the yearbook, they were forearmed with several samples of ads, aiding them in selling to their prospective customers. A variety of ads could easily be produced with Printshop before going out.

Illustrations: 5-8

3/ The director of the musical needed posters that were prepared with silkscreen, but created with computer programs for type, using Multiscribe, Printshop and Printmaster. Posters made this way were very cost-effective relative to commercial printing. Small posters and banners were produced with Printshop for in-school promotion. In addition, the musical director requested some motivation aids which were custom-produced, and used during the rehearsal schedule.

Illustrations: 9-11

4/ The geography teacher requested title pages for several unit workbooks he was preparing. My Computer Science 105 class was given the information, and using

Printshop, they produced the pages as enrichment work within their own course. The music teacher, preparing for a special out-of-school project, requested some publicity sheets (now that he was familiar with the computer work done for him during the musical). He was given a variety to choose from that were prepared partly by computer, partly with a drawn image, cut and pasted together, and photocopied.

Illustrations: 12-18

5/ Computer Science 105 students researched the library catalogue cards to prepare a bibliography of ten books on one topic. They entered their information via the Librarian software (Manitoba Department of Education product). It was a simple application of an on-line library, and the school librarian was invited to the computer class to see their products. She teaches some library skills, and this was shown to her as an example of a computer-related library assignment. It was pointed out to her that Appleworks' database feature could also be used.

6/ One of the geography teachers had displayed a more-than-passing interest in computer applications, so several of his classes that were timetabled at the same time as my Computer Science 105 class were invited to spend several classes working with specific geography programs. The CS105 students acted as peer tutors, having first learned how to operate these programs. On each machine,

there was one tutor, and one or two visiting geography students. They tested Fort Walsh, Up the Creek, and Diary of Black River, which are produced here in Manitoba by MCALC. They spent most of their time working with the popular 'Where in the World is Carmen Sandiego?', enjoying it immensely. The librarian made available for this segment many almanacs and other reference books meant to be used with the program. Students unintentionally built their reference skills while working through the difficulty levels of this program. The use of the Computer Science 105 students as peer tutors was a good decision as the program needs some familiarity, and one teacher would not be enough to answer all questions. The Computer Science 105 students produced a page, using NEWSROOM, describing this event.

Illustration: 19

7/ Several typing classes were slotted in my spares, so with the computer room and interested subject teachers available, I took entire classes, accompanied by their teachers, for several periods to expose them to a diagnostic typing program (Typing Tutor II), then a more entertaining program (Mastertype) to improve their speed and accuracy. Mastertype allows you to make up your own word lists, so their own names were used, personalizing the experience for them. It takes a teacher only about 5 minutes to prepare such a file.

8/ For the art department, computerization aided silkscreening. Silkscreen stencils are normally cut with fine knives, making very tedious work, easily ruined with a bad cut. Stencils are expensive. Instead, the fancy lettering was produced by computer, using Multiscribe, Printshop, or Printmaster. That sheet was photocopied, then transferred by thermofax to make an overhead acetate sheet, with sharp black edges. This becomes the stencil. The silkscreen is painted with photoemulsion, the stencil put on it, exposed to light for 15 minutes, and the image is created. The screen is then rinsed, dried, and is ready for printing within several hours. The art classes concentrated on making personalized, silkscreened, one-color lunchbags. Near Christmas, a poster was made of them, and orders taken. They were sold within the school to recover ink costs.

Illustrations: 20-23

9/ Site 1: The Electronic English part of the practicum was the most structured. The English department was targetted for an experience in word processing integration. After timetable checking, it was discovered that five English classes were available during my spares - three Grade 9 English, English 201, and English 301. Four teachers were involved, one having two of the classes. Teachers were approached in the second month of the semester about the availability of 'borrowing' their classes, with the explanation that the computer integration project was

part of a Master's requirement, and that they might like to gain some computer integration experience. All were co-operative. When surveyed, they preferred the classes to be taken once a week till the end of term, rather than for a shorter, intense period. Before the project began, teachers were surveyed about current topics, books, and skills being studied, so that assignments could be tailored appropriately. All provided some topics on a feedback form they were given. They were all made aware that although they were not required to be in attendance for any of the classes, they were welcome to drop in any time to check on student progress, or to participate themselves. In the course of the term, they were given periodic updates in their mailboxes to spur their interest.

Illustrations: 24-26

In the computer lab, students began the Electronic English project with one class devoted to getting familiar with the machines, and improving their typing using Mastertype, personalized with their own names.

In the following weeks students used Bankstreetwriter for general word processing. This program was picked for its ease of use, the fact that it is not disk-dependent, and because all Grade 9's have used it in their computer literacy block.

Assignments used were generated partly by the subject teachers' suggestions (reinforcing integration, rather than

a project in isolation), and partly by the nature of the software text-editing properties. Students were graded on general effort. This grade was returned to the regular teacher at the end of the project. Students were co-operative, willing, and not very grade-conscious.

Exercises included extending a story, imitating the writing style of an author currently being studied, writing a newspaper story from strange headlines taken from newspapers, inserting sentences between sentences within a passage, writing dialogue by providing one speaker's lines in response to another's given lines, and some grammar work that involved correcting errors, writing sentences to indicate use of homonyms, synonyms, verbs, etc. The Bankstreetwriter Educator's version provides some assignment samples that are useful. Some assignments were right on the computer, others on sheets or via overhead.

At the end of the term, students were surveyed, using two instruments: an externally-produced school sentiment index, and a survey on attitudes to the Electronic English project. Teachers were also surveyed with a separate instrument to obtain attitudes to the project.

Note: All surveys are in the Appendices.

Site 2: The following year, teaching all the computer courses in a non-semestered high school, and teaching two English 101 courses allowed me to integrate computers into the English program. This was done all year, not as a

special project. Students were told to have a scribbler, and a computer disk was sold to each, filed in class for use. Regularly, they were asked to do largely creative writing assignments, saving them to disk. Every quarter, they had to pick one assignment from their computer files, and submit it for grading. The purpose here was to give people with poor handwriting a chance to make up for it by having typed assignments. Unfortunately, they weren't very good typists, either! One class had a machine per student, while the other had some sharing. English 101 students are somewhat distractable when sharing. Students were not surveyed, but were observed. They asked to go to the computer room, went there willingly, and liked to look over one another's work. They became comfortable with storing and printing files. They were frustrated with their poor typing skills, and computer sharing.





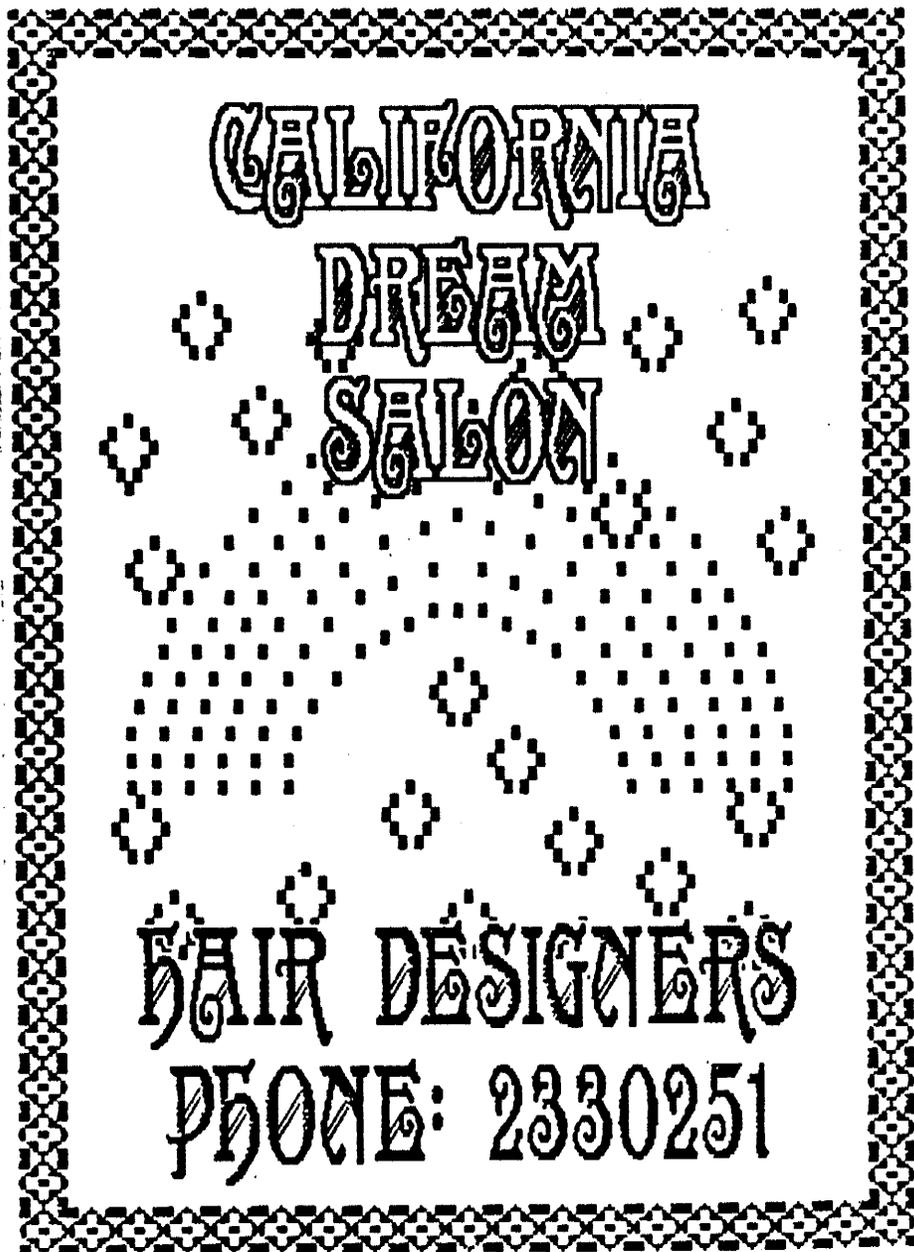
Software: Printshop

Illus.5



Software: Printshop

Illus.6



Software: Printshop

Illus.7



Software: Printshop

Illus.8

**PRC**  
**PRESENTS**  
**A BROADWAY MUSICAL**  
**BYE BYE BIRDIE**  
**MAY 1-1:30 PM**  
**MAY 2,3,4-7:30 PM**  
**STUDENTS: \$3.00**  
**ADULTS: \$5.00**  
**DIRECTED BY:**  
**PATRICK MOORE**  
**(CAST LIST ON REVERSE)**

Software: Printshop

Illus.9

PIERRE RADISSON COLLEGIATE

PRESENTS

**BYE BYE BIRDIE**

MAY 1-4 1987

MUSIC: CHARLES STRAUSS  
 LYRICS: LEE ROOMS



Software: Multiscribe Illus.10

**TEAM WORK  
 AWARD**



TO :  
 THE BYE BYE BIRDIE  
 AWARD  
 FOR  
 HANGIN' IN !

PATRICK MOORE

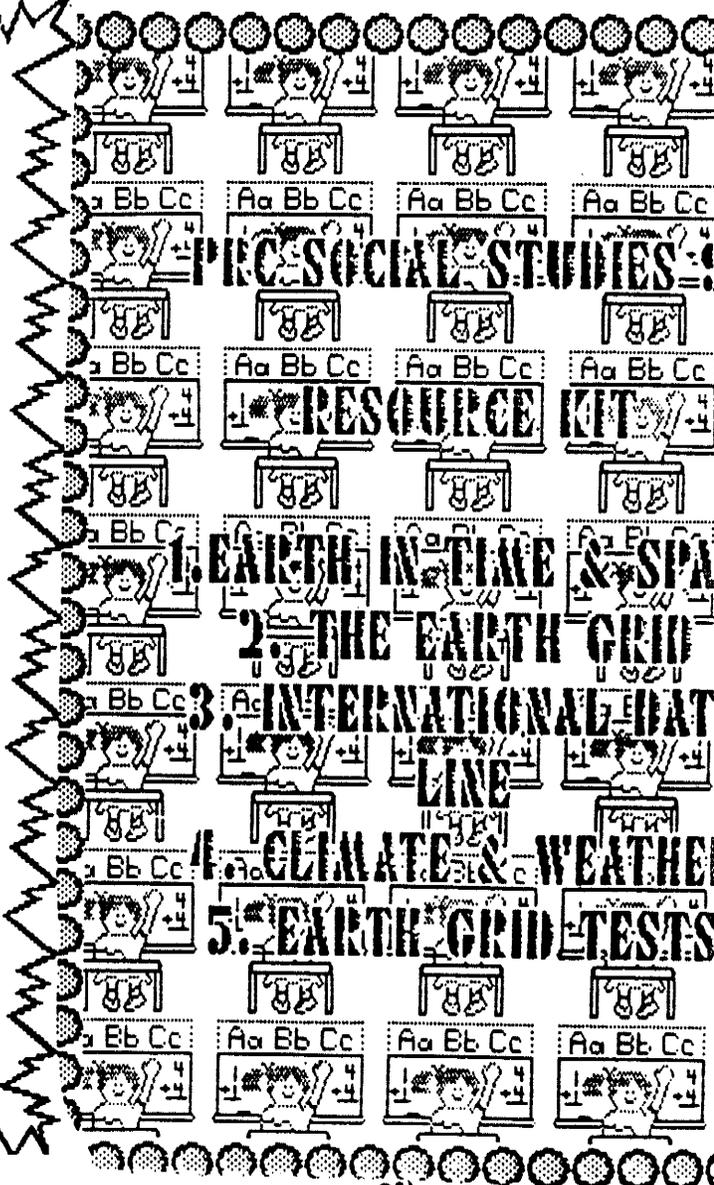
1987

Software: Certificate Maker

Illus.11

P.R.C.  
SOCIAL STUDIES  
GRADE 9  
CANADA TODAY

P.R.C.  
GEOG.100-101



Software: Printshop Illus.12

Software: Printshop

Illus.13

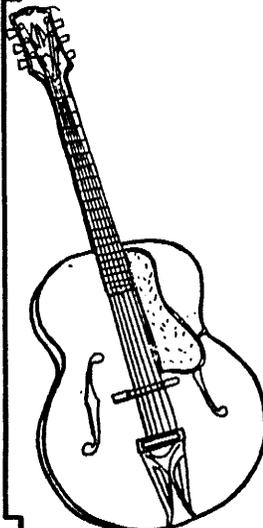
Software: Printshop

Illus.14



**NOW...  
COOL JAZZ  
AT DRAKE'S RESTAURANT  
555 BROADWAY FRI-SAT: 8-MIDNIGHT  
GUITARIST: PAT  
MOORE**

Software: Printshop, Multiscribe Illus.15



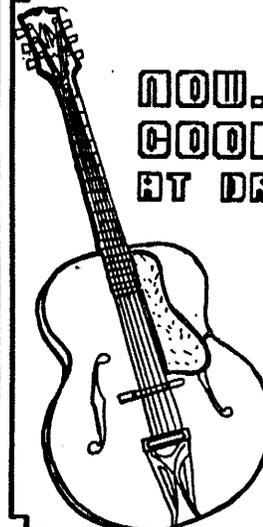
**NOW...  
COOL JAZZ  
AT DRAKE'S RESTAURANT  
555 BROADWAY  
FRI-SAT : 8-MIDNIGHT  
GUITARIST: PAT  
MOORE**

Software: Printshop, Multiscribe Illus.17



**HOT NIGHTS  
OF  
COOL JAZZ  
AT  
DRAKE'S RESTAURANT  
555 BROADWAY  
FRI - SAT : 8 - MIDNIGHT  
GUITARIST :  
PAT MOORE**

Software: Printshop, Multiscribe Illus.16



**NOW...  
COOL JAZZ  
AT DRAKE'S RESTAURANT  
  
555 BROADWAY  
FRI-SAT 8-MIDNIGHT  
GUITARIST: PAT MOORE**

Software: Printshop, Multiscribe Illus.18

# CARMEN SANDIEGO NEWS



## SANTA BRINGS TREATS!

IN THE MONTH OF DECEMBER, WHEN THE COMPUTER SCIENCE 105 STUDENTS WERE BEGINNING TO WEARY OF THAT SAME OLD STUFF (TRANSLATION: PROGRAMMING, PROGRAMMING, PROGRAMMING) THEY RECEIVED AN EXTRA SPECIAL TREAT - A CHANCE TO GET A BREAK FROM WHAT THEY WERE DOING, AND A CHANCE TO GIVE SOME OTHER STUDENTS SOME EXPERIENCE WITH THE COMPUTER. THEY TRIED THE SOFTWARE PACKAGE KNOWN AS CARMEN SANDIEGO -

USEFUL FOR  
GEOGRAPHY AND  
HISTORY  
STUDENTS



KOSOWAN'S KATS  
FOR HALF AN HOUR TEN  
STUDENTS WERE PAIRED  
WITH CS 105 STUDENT

TUTORS  
FOR A  
FUN TIME  
WITH  
CARMEN!  
!BSWAN



KOOL KAT VISITORS:  
JUDY HUSSEY, CLAIR  
DICKINSON, DARREN  
JEANSON, GUY LEVEQUE,  
ROGER  
THOMAS,  
TRINA  
PARISIEN,  
ROCKY  
DUNN



## WHO IS CARMEN SANDIEGO?

SHE'S A TOUGH COOKIE -  
THE MEANEST AND  
SNEAKIEST OF ALL THE  
VILLIANS YOU CAN  
CATCH. IF YOU GET HER  
-INTERPOL WILL  
PROBABLY WANT TO HIRE  
YOU AFTER GRAD.

CS 105 STUDENT TUTORS:  
KELLI PEARY, SUSIE MORIN,  
TRINA MILLS, SHANNON  
DAWN, JEFF KNOCKAERT,  
TIM KONECHNY, PATRICK  
JENIN, LISA LAHAIE, TODD  
BUHAY, RANDY WILLERTON,  
EVA DIMARCO, AND MISS  
MARKS

CHOMPING  
AT THE  
BIT!!

MR.KOSOWA  
N'S CLASS

ARRIVED ONE SUNNY  
DAY WITH CLEAN SHINY  
FACES AND ALMOST  
SUPER HUMAN  
DEDICATION TO WORK



DOBBIE  
BAB



Illus.20

Software: Multiscribe

GOOD FOOD  
GOOD MEAT  
GOOD GOD  
LET'S EAT!  
LOEWEN'S  
LUNCH

Illus.21 Software: Printmaster

**YUMMIES  
FOR THE TUMMY!**

**CHEZ CRAFTON**

Software: Illus.22  
Printshop

**CHEZ**



**LODEWYKS**

Software: Illus.23  
Printmaster

### **ELECTRONIC ENGLISH UPDATE:**

**THE FIRST WEEK, STUDENTS USED TWO TYPING PROGRAMS TO IMPROVE THEIR SPEED AND ACCURACY IN TYPING. THESE PROGRAMS ALSO ENCOURAGED THE USE OF ALL FINGERS, NOT JUST THE HUNT & PECK SYSTEM OF TYPING.**

FROM THE SECOND WEEK ON, STUDENTS WERE INTRODUCED TO A SIMPLE WORD PROCESSING PROGRAM - BANKSTREETWRITER. IT IS SIMPLE TO UNDERSTAND AND OPERATE, AND SERVES AS AN ELECTRONIC SCRIBBLER.

#### **EXERCISES DONE USING THIS PROGRAM WERE:**

**1. SCREEN FILL - STUDENTS WERE GIVEN THE FIRST LINE OF A STORY, AND SEVERAL PHRASES THAT THEY WOULD HAVE TO INSERT IN A PAGE. THEN, THEY TYPED A STORY TO FILL THE SCREEN.**

THE SCREEN FILL ACTIVITY TOOK THE STUDENTS ABOUT A HALF-PERIOD. SOME STUDENTS WANTED TO CONTINUE WITH IT FOR THE DURATION OF THE PERIOD, AND DID. FOR THE OTHERS, I LOADED A PROGRAM CALLED MISSING LINKS THAT HAS THEM READ A PASSAGE AND FILL IN MISSING LETTERS - EITHER VOWELS, CONSONANTS, EVERY SECOND LETTER, ETC. THIS EXERCISE WAS USED FOR ITS NOVELTY, AND ITS ATTENTION TO SPELLING.

#### **THE GRAMMAR EXERCISES DONE TO DATE HAVE BEEN:**

**1. SPELLING - WORDS DICTATED, WHILE STUDENTS TYPE THEM ON SCREEN, WITH BANKSTREETWRITER LOADED IN THEIR MACHINES. THEY ARE THEN CORRECTED, USING THE OVERHEAD TO SHOW THEM THE CORRECT SPELLING.**  
**2. SENTENCES WITH ERRORS - A FILE OF TWENTY SENTENCES CONTAINING GRAMMAR ERRORS WAS LOADED INTO EACH MACHINE. STUDENTS THEN USED BANKSTREETWRITER, WITH ITS FIND AND REPLACE FUNCTION, TO DO CORRECTIONS TO THIS FILE.**

Software: Multiscribe

Illus.24

### **WORD ASSOCIATION AND SYNONYM EXERCISES:**

STUDENTS WERE GIVEN A WORD, AND WITHIN A TIME LIMIT, ENCOURAGED TO FILL THE SCREEN WITH ASSOCIATED WORDS OR SYNONYMS. STUDENTS WERE THEN ASKED TO SUGGEST WHAT WAS A MOST IMPRESSIVE WORD IN THEIR LIST - THE CLASS DISCUSSED THESE CHOICES TOGETHER.

### **NEWS STORY WRITING:**

**STUDENTS WERE GIVEN HEADLINES FROM WPG FREE PRESS STORIES. THEY WERE TOLD ABOUT THE WHO-WHAT-WHEN-WHERE LEAD SENTENCE OF A STORY, AND THE PRINCIPLE OF DIMINISHING IMPORTANCE WITHIN A NEWS STORY. THEY THEN HAD TO WRITE A LEAD PARAGRAPH, AND FOLLOWING PARAGRAPHS OF THE NEWS STORY, UNTIL THE SCREEN WAS FILLED. SOME STUDENTS WENT ON TO FILL A SECOND SCREEN (PAGE).**

### **POETRY :**

STUDENTS ARE WRITING LIMERICKS, QUATRAINS, BALLAD STANZAS, AND STORY POEMS CONSISTING OF RHYMING COUPLETS.

**NOTE: THIS WRITING PROJECT, TAKING ONE SESSION, ALLOWED ME TO SEE THAT THE USE OF ONLY ONE PROGRAM, A SIMPLE WORD PROCESSOR LIKE BANKSTREETWRITER, IN ALL AN ENGLISH TEACHER NEEDS TO DO A UNIT OF ELECTRONIC ENGLISH. MULTISCRIBE IS BEING USED IN THIS DOCUMENT - IT'S POWERFUL, YET SIMPLE.**

Software: Multiscribe

Illus.25

**ELECTRONIC  
ENGLISH  
UPDATE:  
TO:  
NOZAR  
KENNEDY  
KATZ  
THORNHILL**

**FOR THE FIRST WEEK OF ELECTRONIC ENGLISH, THE STUDENTS HAVE BEEN FAMILIARIZING THEMSELVES WITH THE COMPUTER KEYBOARD. THEY ARE DOING THIS USING PROGRAMS DESIGNED TO CREATE FASTER, MORE ACCURATE TYPING SKILLS. THESE PROGRAMS ARE MASTERTYPE, AND TYPING TUTOR.**

**ATTENDANCE:**

**NOZAR 9 - MISSING SHELLEY GROUETTE AND BRAD NICHOLS**

**THORNHILL 9 - MISSING ROSE BODNAR, DENISE DESROSIERS, TARA MCCONKEY DENYSE PICTON, AND SHANNON REMILLARD.**

**KENNEDY 301 - MISSING BOB MILLS AND BRYAN RICHER**

**KATZ 9 - MISSING JASON JANOSKE, CHRIS SMITH, ROB THOMAS, AND SHERI WILLNER**

#### Chapter 4: Analysis and Discussion of Data

Note: In the preparation of the survey instruments administered, there were several publications that were most influential. These books are listed in this chapter's references.

Survey instruments administered during this practicum had as their objective the measurement of attitude. The hoped-for results would be to recognize a positive attitude toward the experience both the teachers and the students had been through during the Electronic English project.

Zimbardo-Ebbesen (1977) presented some cautionary points with respect to attitude testing. They pointed out that in all attitude studies, there seemed to be a lack of common definition of attitude. Also, a lack of common methods of measurement. They noted two oddities: one, that although it is commonly believed that attitudes have both cognitive and affective components, measurement is often done by presenting the subject with a set of cognitive beliefs, and then measuring the affect, and, two, that psychometrics (psychological scaling) and attitude change are often not studied together, even though they are interdependent. The scaling techniques they refer to are like those of Thurstone, Likert, Guttman, Osgood, Coombs,

Lazarsfeld, and others. Two assumptions go along with these scaling forms: one, that subjective attitudes can be measured by a quantitative technique, and two, that a particular test item has the same meaning for all respondents.

Henerson et al (1978) do not question the concept of attitude testing; instead, they describe how it should be done. They suggest that in making a questionnaire, once the initial batch of questions has been prepared, it should be fine-tuned by using item analysis, for the purpose of selecting from a pool of items the ones that most effectively obtain the information you want, and to eliminate the less effective items from your instrument. In this experiment, item analysis could not be employed because the questions could only be tested on someone who had been through the Electronic English project. Because an agreement scale is being used for responses, the intensity of attitude is what becomes measured in this fashion. They note as precaution that there are threats to validity, even with testing rigorously prepared. These threats are: the inevitably weak link between attitudes and behavior, a response bias due to desire to please or to evaluation apprehension, a lack of comprehension or self-awareness, a lack of objectivity in administration, and too few items. They suggest ways to counteract these threats to the three types of validity in question: construct validity ( how well

the instrument measures what it claims to), content validity ( how well the items give appropriate emphasis to the various components of the construct, and predictive validity (the test's usefulness for making decisions about people). As much as possible, their advice was followed in the making and administration of these questionnaires.

At the completion of the project, both the teachers and the students were given questionnaires. The questionnaires for both were intended not so much to reveal an attitude change, as much as to reveal a positive attitude to the experience. Because they had all experienced a new way of dealing with subject matter, it did not seem reasonable to use a pre-test, post-test system, as they in the pre-test would have been simply speculating on whether they would like to do something, compared with whether they actually liked it. More relevant was whether they liked it, after having done it.

Questions administered to both groups were answered anonymously, with prior knowledge. The teachers were given their questionnaires privately, each in their mailboxes, with instructions, and requests for return within several days to the questioner's mailbox. The student questionnaires were administered in class, at the completion of the Electronic English project. The anonymity was stressed, to encourage reliable answering. Although in the general population of teachers and students alike, surveys

are considered a nuisance, a plea for an honest response was made, so that the surveys would be taken seriously.

In response to a set of statements, both teachers and students used a Likert scaling system, using four degrees of intensity of attitude, from strongly agree to strongly disagree. There was no fifth, middle-of-the-road position provided, so that the subject would have to express either a distinctly positive or a distinctly negative attitude. This decision to use a 4-point scale came about because another, externally-prepared questionnaire was given to the students at the same time, and it used a 4-point scale. This other questionnaire, administered in the first 20 minutes of the period, was prepared by the Instructional Objectives Exchange of California, and attempted to measure attitude to school by generating a school sentiment index. The questionnaire is composed of 82 statements about school, with subsets referring to attitudes towards mode of instruction, authority and control, interpersonal relationships with students, learning, social structure and climate, peers, and general statements. In the directions for administration, it is mentioned that subsets can be scored, or a single score can be obtained from the 82 items, yielding a global estimate of attitude toward school. The structure of this test was used as a model for the other questionnaires administered. It could also be used as a point of interest, to see whether scores on the School

Sentiment Questionnaire would be in agreement with the Electronic English Questionnaire results.

Profile of subjects:

Teachers - four teachers

- all are English teachers
- one teacher had two classes in this project

Students - four classes surveyed:

- an English 301 class, 19 students, many with business course backgrounds, so they were good typists.
- 3 levels of Grade nine English: basic (14 students), average (18 students), above average (18 students). Previous computer experience: 4-week literacy block, no previous typing experience.

Instructions given:

To teachers - Required to answer on standard, computer-gradable forms.

- survey sheets had as opening information:

Scoring: please use the following method:

For each number, there are five possible choices on the computerized answer sheet: A, B, C, D, E.

Ignore the 'E' category.

Use the following guides for answering:

A - strongly agree with statement

B - agree with statement

C - disagree with statement

D - strongly disagree with statement

Note: these statements are set to force a positive or negative response. There is no category for 'maybe'. Answering is anonymous. Please do not feel compelled to answer in any way other than honestly. Thanks.

To students - Directions to fill in the bubble on the answer sheet, according to the scoring instructions as given to the teachers.

(The actual questionnaires are available in the Appendices.)

Scoring: For all questionnaires, there were four choices of response, and statements were prepared to have scores scaled up and down, intermixed. Strongly agree counted for 4 in a positive statement, or a 1 in a negative statement.

The teacher surveys were hand scored, and the student surveys were scored by the University of Manitoba Administration computer support staff, using their standard scoring program to look for greatest frequency of response in a question. A global score was hand-scored for each teacher, and for each class as a group.

Teachers were given a global score, plus a score under four subsets:

Subset A: Attitude to the coming of computers

Questions: Positive - 11,16,28,34 Negative - 5,17

Subset B: Attitude to the understanding of project

Questions: Positive - 1,27 Negative - 25,26

Subset C: Attitude to integration of computers

Questions: Positive - 3,7,8,10,12, Negative - 2,4,9,  
14,15,18,31 20,33

Subset D: Attitude to change in personal teaching style

Questions: Positive - 6,19,21,24, Negative - 13,22,23,  
30 29,32,35

Total: 20 Total: 15

Highest possible score:  $35 \times 4 = 140$

Lowest possible score:  $35 \times 1 = 35$

Global Teacher scores:

Teacher:	Raw Score:	Percentage:
T1:	70/140	50%
T2:	103/140	73.5%
T3:	85/140	60.7%
T4:	84/116	72.4%

Average: 64.1%

Subset A:

Teacher:	Raw Score:	Percentage:
----------	------------	-------------

50

T1:	13/24	54.1%
T2:	18/24	75%
T3:	15/24	62.5%
T4:	14/20	70%
Average:	60/92	65.1%

Subset B:

Teacher:	Raw Score:	Percentage:
T1:	8/16	50%
T2:	11/16	68.7%
T3:	10/16	62.5%
T4:	11/16	68.7%
Average:	40/64	62.5%

Subset C:

Teacher:	Raw Score:	Percentage:
T1:	25/56	44.6%
T2:	40/56	71.4%
T3:	38/56	67.8%
T4:	29/44	65.9%
Average:	132/212	62.2%

Subset D:

Teacher:	Raw Score:	Percentage:
----------	------------	-------------

T1:	23/44	52.2%
T2:	33/44	75%
T3:	23/44	52.2%
T4:	27/36	75%
Average:	106/168	63%

In addition to the information obtained above, it may be of interest to look at the commonality of opinion in the survey instrument. Those statements with high (75%) approval or disapproval, and those with low (25%) approval or disapproval, are summarized below:

75% (3 out of 4) teachers agree with:

- I was enough informed about the nature of the Electronic English project to know what it was attempting to explore/accomplish.
- Computers will become more important in education every coming year.
- I am interested in computer use within the school setting, other than for computer science.
- I believe students would become more responsible writers if they regularly used computer programs that easily allowed them to revise and polish their work.
- Learning about computer use in my subject area may eventually help me protect my job.

75% (3 out of 4) teachers disagree with:

- Computers in education are a fad, like open area.
- I feel using computers in my subject area would not really be an example of professional development for me.

25% (1 in 4) teachers agree with:

- I am familiar with some of the computer programs that are available to be used in my subject area.
- After this Electronic English project is over, I hope to try these projects myself with future classes.
- I feel that my teaching techniques/style is/are constantly changing or evolving.
- I think the school administration would like me to get involved in the use of computers in my subject field.
- I have a computer at home for my personal use.

25% (1 in 4) teachers disagree with:

- I personally have never used a computer as part of my teaching.
- In my classroom, I don't have any computers, so I don't even think about how they can be used in my subject area.
- I have not significantly changed my teaching habits/style within my subject area over the past while.

The student surveys, comprised of first the School Sentiment Index, and then the Electronic English survey, were both administered within one class period. A global score was prepared for each class, for each of the two

instruments. Commonality of response was generated by the University of Manitoba computer program.

Codes used:

C1: English 301  
 C2: English 9 above average  
 C3: English 9 average  
 C4: English 9 basic

School Sentiment Index Global scores:

Class:	Raw score:	Percentage:
C1:	219/328	66.7%
C2:	213/328	64.9%
C3:	198/328	60.3%
C4:	217/328	66.1%
Average:	847/1312	64.5%

Electronic English Survey Global scores:

Class:	Raw score:	Percentage:
C1:	122/176	69.3%
C2:	121/176	68.7%
C3:	130/176	73.8%
C4:	131/176	75.7%
Average:	504/704	71.8%

Commonality of opinion:

C1:

Agreement:

- 84.2% Doing Electronic English was a break from doing ordinary English.
- 84.2% Doing Electronic English was a nice change from doing ordinary English assignments.
- 78.9% The first class in Electronic English using computers we learned typing skills, with special typing programs.
- 73.7% Being able to use computers will probably help me when I look for a job.
- 73.7% I like to use computers.

Disagreement:

- 84.3% I don't care if I spell words right, either on computer, or with paper and pencil.
- 78.9% I use computers on my own time quite a bit.
- 73.7% Doing this special Electronic English for two months was too long.
- 73.7% I did not enjoy the Electronic English project.
- 73.6% We should use computers only for computer classes, not for other subjects, like English.

C2:

Agreement:

- 94.4% I like to learn with computers because computers are involved in so many jobs.

- 94.4% I like to learn how to use computers in English.
- 88.9% I wish we had done Electronic English all term, instead of just for two months.
- 88.9% Being able to use computers will probably help me when I look for a job.
- 88.8% I like to use computers.
- 83.3% doing Electronic English was a break from doing ordinary English.

## Disagreement:

- 88.9% Doing this special Electronic English project for two months was too long.
- 88.9% This is the first time I ever used a computer this year.
- 88.9% I did not enjoy the Electronic English project.
- 83.3% I don't care if I spell words right, either on computer, or with paper and pencil.
- 83.3% After I leave this special project I'll probably never touch a computer again.
- 77.8% In my life, I don't expect to be using computers, so I don't care if I'm not familiar with using them.
- 77.8% The Electronic English project was a waste of my time.

C3:

Agreement:

- 83.3% I like to learn how to use computers in English.
- 77.8% I like to learn with computers because computers are involved in so many jobs in the actual workplace.

## Disagreement:

- 83.4% The Electronic English assignments were like the assignments we do in regular English class.
- 83.3% I don't care if I spell words right, either on computer, or with paper and pencil.
- 77.8% I use computers on my own time quite a bit.
- 77.7% We should use computers only for computer classes, not for other subjects, like English.

## C4:

## Agreement:

- 92.9% My regular English teacher told us this project would be fun.
- 85.8% I tried my best to improve my typing using the typing programs on the computer.
- 85.7% I can correct my spelling mistakes more easily on the computer than by using pencil and paper.
- 85.7% After I leave this special project I'll probably never touch a computer again.
- 78.6% Doing Electronic English was a break from doing ordinary English.
- 78.6% Using the computer to write makes my thinking flow

- more easily.
- 78.6% My regular English teacher suggested this special project would be useful for us.
- 78.6% I wish we had done Electronic English all term, instead of just for two months.
- 78.6% I pay more attention to my work when I use a computer than when I use paper and pencil.
- 78.6% Doing Electronic English was a nice change from doing ordinary English assignments.
- 78.6% The first class in Electronic English using computers we learned typing skills, with special typing programs.

Note: Only one question produced widely-varying results between two classes: over 80% in the Grade 9 Basic class agreed they would never use computers again, while the Grade 9 above average class felt just the opposite.

## Chapter 5: Conclusions and Recommendations

### Conclusions:

For teachers and students, the objective of this practicum was to demonstrate the validity of computers as an aid to teaching and learning in a wide range of academic experiences. In addition, it aimed to:

- introduce the possibility of computer integration into their daily school activities,
- lower apprehension about using computers, and
- raise interest in using computers.

Students were able to demonstrate that they could integrate computer use into their academic environments. They indicated strongly-positive attitudes to computer integration, and an understanding of the impact computers have on their lives, not only at school, but also in the workplace. However, for those students who were not proficient in typing, word processing produced some frustration.

For teachers, integration proves to be more demanding: learning about software choices, learning how to use software (e.g. Appleworks manual is over 300 pages), time to work with machines. Judging by the degree of carryover, or lack of it after the practicum experiment, I don't believe

too many teachers are willing to meet those demands yet. The literature reviewed suggested a blanket program is needed to make such changes. The scope of this practicum was too localized to serve that function.

In summary, the experiment indicated student acceptance and student learning via integrated computer use. It did not indicate a marked change in teacher behaviors.

Recommendations:

In order to facilitate integration of computer use across the school curriculum:

1. Software for general teacher use should be catalogued and kept in the library so that the availability of resources is made easy.
2. All teachers within a school should spend In-Service time mastering some general software, course-specific software, and teacher utilities.
3. Commitment to the idea of integration of computer use across the curriculum should be a concerted effort by all levels: the School Board, Superintendent's Department, School Administrators, Department Heads, and teachers.
4. Educators in Manitoba should make full use of the services available to them, which are:
  - (a) - Educational Technology Program (ETP)
  - (b) - Man-Ace
  - (c) - Special Area Groups

(d) - Divisional computer co-ordinators

(a) ETP, 1970 Ness Avenue in Winnipeg, supports the implementation of technology in Manitoba schools via the following services:

- courses, workshops, in-services, summer programs
- curriculum revision
- publishing the ETP newsletter
- administrative applications
- technical support staff
- MINET (Manitoba Information Network), a joint venture with Cybershare, and the Manitoba Telephone System
- a non-lending library of software and materials, available for on-site preview

(b) Man-Ace (formerly Man-Aeds), a members group, provides a yearly conference, regular meetings, and mailings. (see Appendices for sample)

(c) Special Area Groups (SAG) have an annual Manitoba-wide In-Service day in October. All groups, including MAN-Ace (Manitoba Association for Computing Educators) present a full day of speakers and workshops. Promotion sheets for that day dating back to 1985 show the growing number of workshops devoted to computer integration:

In 1985, MAN-Ace presented 11 topics, and other SAG groups with 20 computer-related presentations included: Business Education, Science, Art, Social Sciences, Manitoba School Language & Audio-Visual Association, Vocational

Education, Early Childhood Education, Manitoba Association of Teachers of English, Mathematics.

In 1986, MAN-Ace presented 29 topics, and other SAG groups with 14 computer-related presentations included: Social Sciences, Business Education, Manitoba Association of Principals, Mathematics, Industrial Arts, Science, Physical Education.

In 1987, MAN-Ace presented 35 topics, and other SAG groups with 20 computer-related presentations included English as a Second Language, Reading Council, Manitoba Music Educators, Manitoba Association of Teachers of English, Industrial Arts and Vocational Guidance, Science, Mathematics, Business Education, Social Science.

(Information courtesy Doris Burns, Manitoba Teachers' Society)

(d) A full-time computer co-ordinator should be available in each division to oversee the development of computer use.

Divisional computer co-ordinators exist for all Winnipeg school divisions. They belong to a group (CECM). Each division has a co-ordinator, not always full-time, and some divisions (St. James, Winnipeg, St. Vital) have two. Often they are not computer teachers, either by default or design. Some divisions specifically prefer them not to be computer teachers so they can think in terms of integration, rather than segregation (e.g. Ft. Garry).

A recent survey of computer co-ordinators of ten of the Winnipeg divisions was taken. Hardware availabilities, and the degree of computer integration within their divisions were of interest. In many instances, they indicated that integration was taking place, but this was qualified with terms like 'little', or 'limited'(Illus. 27-28). The survey indicated that schools were sufficiently equipped with hardware to attempt a broadening of their current computer use.

A need exists for ongoing assessment of the degree of computer use in general education in order to continue the development of this exciting expansion of teaching and learning into the 1990's.

COMPUTER USAGE SURVEY

=====

1. GENERALLY, WITHIN HIGH SCHOOLS IN YOUR DIVISION, ARE THE FOLLOWING BEING TAUGHT:

	YES	NO
COMPUTER SCIENCE (205, 305, OR BOTH)	//	.....
COMPUTER AWARENESS 105	//	.....
COMPUTER LITERACY (GR 9)	9	2
DATA PROCESSING	//	.....

2. DO MOST HIGH SCHOOLS IN YOUR DIVISION HAVE AT LEAST ONE COMPUTER LAB?

YES	NO
//	.....

3. DOES THAT LAB HAVE:  
BETWEEN:

.....	5-10 INDIVIDUAL MICROCOMPUTERS
.....	10-15 INDIVIDUAL MICROCOMPUTERS
.....	15-20 INDIVIDUAL MICROCOMPUTERS
.....	MORE THAN 20..

4. IS EACH LAB EQUIPPED ALSO WITH A CORRESPONDING NUMBER OF DISK DRIVES?

YES	NO
10	1

5. AND SOME PRINTERS?

.....	0 PRINTERS
.....	1-3 PRINTERS
.....	MORE THAN 3..

6. ARE MOST MICROS:

.....	10	.....	FREESTANDING, OR /AND
.....	4	.....	NETWORKED ON SITE, OR
.....		.....	LINKED TO

MAINFRAME (CYBERSHARE)

7. TO THE BEST OF YOUR KNOWLEDGE, ARE COMPUTERS BEING INTEGRATED INTO SUBJECT AREAS OTHER THAN THE ONES MENTIONED IN QUESTION ONE?

(OTHER: E.G. ENGLISH, ART, SCIENCE, MATH, FRENCH, HOME EC, ETC)

YES	NO
2	3

8. IN YOUR DIVISION, HAS THE SCHOOL BOARD PROPOSED ANY IDEAS ON THE USE OF COMPUTERS WITHIN THE ESTABLISHED SUBJECT AREAS (AS IN QUESTION ONE), OR OTHER NON-COMPUTER-RELATED SUBJECT AREAS (AS IN QUESTION SEVEN)?

YES NO  
.....7.....6...

9. IN YOUR DIVISION, HAS THE SUPERINTENDENT'S DEPARTMENT PROPOSED ANY SUCH IDEAS?

YES NO  
.....6.....4...

10. IN YOUR DIVISION, IF COMPUTER USE IN THESE OTHER AREAS HAS BEEN ENCOURAGED, WHOSE DECISION WOULD IT LIKELY HAVE BEEN TO DO SO?

(CHECK THE ONES THAT APPLY:)

- ...1...SCHOOL BOARD RECOMMENDATION
- ...~~2~~...SUPERINTENDENT'S DEPARTMENT RECOMMENDATION
- ...6...COMPUTER CONSULTANT'S RECOMMENDATION
- ...6...SPECIAL COMMITTEE RECOMMENDATION
- ...~~4~~...SCHOOL-BASED PRINCIPAL'S RECOMMENDATION
- ...~~4~~...SCHOOL-BASED COMPUTER DEPT. IDEA
- ...6...SCHOOL-BASED SUBJECT DEPT. HEAD IDEA
- ...7...SCHOOL-BASED INDIVIDUAL TEACHER INITIATED

INTEREST AND DEVELOPMENT.

11. IS THERE A POLICY OF COMPUTER CURRICULUM DEVELOPMENT WITHIN YOUR DIVISION?

YES NO  
.....7.....4...

12. IF SO, WHO MAKES THE POLICY?

.....Commonly, special committees, or groups.....  
.....of the ones mentioned in #10.....  
.....  
.....  
.....

THANKS AGAIN FOR YOUR TIME. IF ANY OF THE QUESTIONS DID NOT SEEM SUITABLE, OR IF THEY DIDN'T COVER WHAT YOU THINK SHOULD HAVE BEEN MENTIONED, PLEASE COMMENT BELOW:

.....  
.....  
.....  
.....  
.....

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APPENDICES

- 1..... School Sentiment Index
- 2.....Electronic English Student Survey
- 3.....Electronic English Teacher Survey
- 4..... Covering letter to Divisional Computer Co-ordinators
- 5..... Man-Ace Conference Sample Info

APPENDIX 1:

1. Most of my teachers try to explain to me why I deserve the grades I earn on assignments and tests.
2. I do my best in school because I can get ahead in the world with a good education.
3. Most of my teachers seem interested in the things I do outside of school.
4. Each morning I look forward to coming to school.
5. My school has too many rules.
6. Most of my teachers do not allow students much choice in what they study in class.
7. I often feel rushed and nervous at school.
8. Most of my teachers give assignments that are too difficult.
9. Students here are not as friendly as in other schools.
10. Most of my teachers try to make their subjects interesting to me.
11. I hate having to do homework.
12. My teachers are interested in what I have to say.
13. It is clear to me why I shouldn't drop out of school.
14. This school is run like a prison.
15. In most of my classes, I have the opportunity to choose assignments which are most interesting to me.
16. I have signed up for a subject just because it seemed like it would be interesting.
17. Most of my teachers give assignments that are just busy-work.
18. I enjoy working on class projects with other students.
19. Most of my teachers really like their subjects.
20. I would rather play a game that I already know than learn a new one.
21. Most of my teachers seem personally concerned about me.
22. I enjoy learning in school more than learning on my own.
23. I don't usually enjoy working on puzzles and trying to solve difficult problems.
24. I think there is too much pressure in school.
25. Most of my teachers will accept suggestions from their students.
26. School is a good place for making friends.
27. I like the challenge of a difficult assignment.
28. Most of my teachers don't try very hard to understand young people.
29. Skipping school whenever I can doesn't really bother me.
30. I find it difficult to start working on my assignments until they are almost due.
31. I'm very interested in what goes on at this school.
32. Most of the decisions in my classes are made by the teachers.
33. My teachers ask me to memorize too many facts.
34. There are other reasons for going to school besides just learning.
35. There are important subjects not taught in school now which I would be interested in taking if they were offered.
36. Students have voice in determining how this school is run.
37. Most of my teachers have encouraged me to think for myself.
38. I think most of my teachers are fair to me.
39. I generally try to get involved in many school activities.
40. Most of my teachers give me some idea of what will be on their tests.
41. I really like most of the kids at this school.
42. My teachers don't allow me to be as creative as I am able to be.

43. Most of my teachers do not recognize my right to a different opinion.
44. It would be difficult to get the most popular kids in school to include those who aren't as popular in their activities.
45. Even if I wanted to join certain groups here at school, I just wouldn't be accepted.
46. I enjoy talking to many of my teachers after class.
47. Most of my teachers are critical of the way young people dress or talk.
48. In order to win an office at this school you've got to be in the right crowd.
49. Many of my teachers frequently show a lack of preparation.
50. It isn't difficult for a new student to find friends here.
51. Many of my teachers could be trusted if I discussed a personal problem with them.
52. My favorite classes, regardless of subject, are those in which I learn the most.
53. School is important to me because I find many of the things I learn are useful outside of school.
54. School is just a place to keep kids off the street.
55. Our school is so large, I often feel lost in the crowd.
56. I usually get the grade I deserve in a class.
57. Teachers are usually the friendliest with the bright students.
58. I try to do good work in my classes, because you never know when the information will be useful.
59. Most of my teachers are still fair with me as a person even when I've done poorly on my school work.
60. There are enough different groups here at school for any type of student to find friends.
61. Most of my teachers make it clear about how much the students can "get away with" in class.
62. I enjoy the social life here.
63. Everyone knows who the real losers in this school are.
64. There are many closed groups of students here.
65. Most of my teachers like working with young people.
66. Sometimes I just can't put a book down until I'm finished with it.
67. Most of my teachers are too concerned with discipline sometimes.
68. It is difficult for me to see my education as a stepping stone to future success.
69. At school, other people really care about me.
70. If I thought I could win, I'd like to run for an elected student body office.
71. Most of my teachers will discuss any changes made to my grade.
72. Most of my teachers just don't care about students if they're not going to college.
73. I usually never do more school work than just what is assigned.
74. Most of the teachers at my school cannot control their classes.
75. It is possible to be popular in school and also be an individualist.
76. Lunch time at school is not fun.
77. Many of my teachers are often impatient.
78. If I had the choice, I wouldn't go to school at all.
79. Many of my teachers have "pets".
80. Most of my teachers often waste too much time explaining things.
81. Occasionally I have discovered things on my own that were related to some of my school subjects.
82. If school were more related to the skills I'll need after I graduate, I might be more interested.

## APPENDIX 2:

## ELECTRONIC ENGLISH SURVEY QUESTIONS:

101. I use computers on my own time quite a bit.
102. Doing Electronic English was a break from doing ordinary English.
103. Doing this special Electronic English for two months was too long.
104. Being able to use computers will probably help me when I look for a job.
105. I like to learn with computers because computers are involved in so many jobs in the actual workplace.
106. I don't care if I spell words right, either on computer, or with paper and pencil.
107. I let my regular English teacher know that I like to use computers for English class.
108. Using the computer to write makes my thinking flow more easily.
109. I can correct my spelling mistakes more easily on the computer than by using paper and pencil.
110. I don't like to write stories using paper and pencil.
111. My regular English teacher told us this project would be fun.
112. The first class in Electronic English, using computers was boring.
113. I like English class, whether it's with paper and pencil, or with computers.

114. Using the computer makes me work harder than sitting in class with paper and pencil.

115. The first class in Electronic English using computers was fun.

116. After I leave this special project I'll probably never touch a computer again.

117. Using computers is no advantage over using paper and pencil.

118. I like to use computers.

119. Before we started Electronic English, my regular English teacher told us we would be doing a special project on computers.

120. My regular English teacher suggested this special project would be useful for us.

121. The Electronic English assignments were like the assignments we do in regular English class.

122. This is the first time I ever used a computer this year.

123. I wish we had done Electronic English all term, instead of just for two months.

124. Using the computer for a writing assignment does not help me to concentrate better on my work.

125. We should use computers only for computer classes, not for other subjects, like English.

126. I don't like to write stories using the computer.

127. I write more easily using paper and pencil than by using the computer.
128. The first class in Electronic English using computers was educational.
129. I don't like to use computers to do regular class work.
130. I always proofread my work when I write with paper and pencil.
131. Writing is easier on the computer than on paper because I can make corrections more easily on the computer.
132. My regular English teachers told us to be co-operative on the Electronic English assignment.
133. I'm glad my regular English teacher did not make us use computers in our usual English class.
134. In my life, I don't expect to be using computers, so I don't care if I'm not familiar with using them.
135. I did not enjoy the Electronic English project.
136. The Electronic English project was a waste of my time.
137. I pay more attention to my work when I use a computer than when I use paper and pencil.
138. I talk less to other people in class if I work with a computer rather than with paper and pencil.
139. Using computers for writing assignments is too complicated.
140. Doing Electronic English was an nice change from doing ordinary English assignments.

141. The first class in Electronic English using computers we learned typing skills, with special typing programs.

142. My typing skills did not improve after using typing programs on the computer.

143. I like to learn how to use computers in English.

144. I tried my best to improve my typing using the typing programs on the computer.

APPENDIX 3:

TEACHER SURVEY: ELECTRONIC ENGLISH PROJECT

1. I was enough informed about the nature of the Electronic English project to know what it was attempting to explore/accomplish.
2. I personally have never used a computer as part of my teaching.
3. I see the computer as an audio-visual aid, much like a VCR, or film projector.
4. I see the computer as something mostly confined to the Computer Science department.
5. I do not believe I will ever be compelled to make use of computers in my teaching.
6. I would like to learn to use computers to complement my teaching.
7. I believe computers can be used best for remedial work in my subject area.
8. I believe computers can be used best for enrichment work in my subject area.
9. I believe computers can be used best for reward/fun work in my subject area.
10. I am familiar with some of the computer programs that are available to be used with my subject area.
11. I have a computer at home for personal use.
12. I would like to become familiar with using computers and software programs in my subject area.

13. In my classroom, I don't have any computers, so I don't even think about how they can be used in my subject area.
14. I would like to have a computer in my classroom for use in my subject area.
15. I would like to be able to take my class to the computer room to use all the computers for my subject area.
16. Computers will become more important in education every coming year.
17. Computers in education are a fad, like open area.
18. I am interested in computer use within the school setting, other than for computer science.
19. After this Electronic English project is over, I hope to try these projects myself with future classes.
20. I don't think the ocomputer can be a very important aid in teaching writing.
21. I would like to use computers if they would make the teaching of writing easier for me.
22. I have not significantly changed by teaching habits/style within my subject area over the past while.
23. I think basic teaching techniques don't change much over time, even though teachnology changed, like the addition of computers.
24. I feel that my teaching techniques/style is/are constantly changing or evolving.

25. The best thing, for me, about the Electronic English project was that it gave me a break from teaching some classes at a time of year when that is quite welcome.
26. I do not see much point to the purpose of the Electronic English project.
27. I believe the Electronic English project is attempting to teach writing on computer screens rather than on scribbler pages.
28. I think the school administration would like me to get involved in the use of computers in my subject field.
29. I feel using computers in my subject area would not really be an example of 'professional development'.
30. I believe students would become more responsible writers if they regularly used computer programs that easily allowed them to revise and polish their work.
32. I can teach writing best in my own classroom, with my own methods.
33. Improving writing skills does not significantly improve thinking skills.
34. Learning about computer use in my subject area may eventually help me protect my job.
35. I don't want to have to learn about how to use computers in my subject area if I can possibly help it.