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THOSE AMAZING COMPUTERS

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PHOTO CREDITS

Burnaby School Board — cover; Gibson's Studio — p. 46; Provincial Educational Media Centre — pp. 5 (middle), 10, 26; Barry Underwood — pp. 5 (bottom), 11, 13 (left), 23, 32, 34, 35; Vancouver School Board Audio Visual Services — pp. 9, 13 (right), 14, 25, 29, 31; Lee Venables — pp. 19, 20.

COVER STORY

The two youngsters staring intently at the screen of a computer set the theme for this issue: Those Amazing Computers — and their role in education. Both students and teachers have been affected by computers already, and the influence of the machines on education promises to become even more pervasive.

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From Our Readers

BUSINESS COMPLIMENTARY

●Thank you for sending me copies of your magazine (March-April)that contained the article bearing my name. I was extremely impressed with the opening article, "Dear Liz." Whoever wrote it is certainly to be congratulated and I would be grateful if you would do so on my behalf.

There are two reasons for this enthusiasm. First, with the general content of the article. Second, and more important from my viewpoint, was the new insight it gave me into how rapidly education had evolved and become a reasonably universal characteristic. While it was also in the centre spread in the magazine, which you yourself had prepared, it was the realization — which had never before occurred to me — that the grandfathers of children now entering high school were probably the first generation that had any education whatsoever. As I write this letter and think about it, I'm not too sure this is actually the fact. However, the situation for British Columbia should not be hard to ascertain, and when I have a moment I plan to do so and include it in some speeches I am making for the royal commission to show how quickly developments have taken place.

Incidentally, I did look up the British Columbia population from the 1871 census; at that time it was 36,247 and since there were only 32 school teachers in 1874 the ratio was one teacher to 1,000 people at that time. The age distribution of the population would be significant in that regard and I suspect the adult population was a far higher percentage since almost everyone would have immigrated.

In any event, an excellent article that set me to thinking.

You have an excellent publication and are to be congratulated.

William M. Hamilton,
President and Chief
Executive Officer,
Employers' Council of B.C.

NOTE: Mr. Hamilton has since retired from his position with the Employers' Council.

TWO CORRECTIONS

●The article by Frank Snowsell in your March-April issue refers to the first 20 years of his teaching career. My period of service, 1931-1974, closely coincides with his. While most of his remarks match my experience, two of his statements leave the wrong impression, especially in relation to his time frame.

The first is the suggestion that "Grade 8 or age 15, whichever came first, was school leaving," and, ". . . if a child failed or. . . was seen to be incompatible with the school system, out he or she went." While this might have been true in some areas I did not come in contact with it.

As a result of the Putman-Weir Report of the 1920s the establishment of the junior high school had made a sound start in creating an emphasis on the child rather than the system. In the areas where I served every effort was made to adjust the organization to what the student had to offer. Even where the junior high did not exist efforts were encouraged to follow the example of its philosophy.

Those of us who had the task of teaching these "problem" grades (7, 8, 9) were well tutored in our responsibility for making school a more useful and interesting place for *all* students. Thanks to the leadership of our administrators, the BCTF and some sensible people inside the Department of Education, we were able to make much progress in overcoming the problem referred to by Mr. Snowsell, certainly well within the first 20 years of my tenure.

Thanks, in part, to the example set by the teachers in these grades, the senior high curriculum was expanded so it became more attractive to *all* students. By the late 30s the schools in which I served suffered from overcrowding due, in part certainly, to their capacity to retain population.

The second unsatisfactory suggestion is, "Since youngsters of limited academic ability and interests were retained in school. . . music, art and many of the so-called 'frills' of today were essential. . . ." I understood, and our staffs operated on the principle, that these subjects were offered to make available to *all* students material, functional to society, other than the narrowly academic content, and also to introduce them to skills of which they were unaware. Regardless of intellectual ability, even today, many students have a relatively narrow exposure, outside of school, to interests they would find worth while. Schools of the first half of my experience made a worthwhile attempt at bringing *all* students in contact with valid educational choices and laid the groundwork for the diversity of interests promoted in the secondary schools of today. Things were not uniformly as bad as described.

While we cannot forsake a solid background in the basics, our schools must continue to be prepared to open up to every student the educational experiences needed for personal gratification and social survival. It was a source of satisfaction for many of us to have been able to assist in the beginning of this development. We trust that others will keep the process active so that new forms of knowledge, sprouting from the old, will find a place in our institutions.

The pioneers of the '20s and '30s were really on the right track. Let's keep blazing the trail!

T. M. Chalmers,
Vancouver

THE COMPUTER PSA

●The Computer Using Educators of B.C. would like to invite you to join their organization. CUEBC, as we are called, is a Provincial Specialist Association of the BCTF. Our purpose is to keep in touch with each other as computer using teachers, and to keep abreast of the most recent developments in the field. The CUE Journal is published four times during the year, and a president's newsletter is mailed to you in the months in which no journal is published.

We are in the process of establishing local specialist associations (LSAs) to increase communication on a district or regional basis.

For membership or LSA information, contact Kitty Chase at 929-1141 (home), or 929-2922 (school), or write to: 1562 Berkley Road, North Vancouver V7H 1Y8

Kitty Chase,
North Vancouver

HISTORY CONTEST

●The B.C. Historical Federation invites submissions for its first annual competition for writers of B.C. history. Entries are welcomed from any person or group that has published a book on local or provincial history within the 1983 calendar year.

Any book, whether written as a thesis, or a community project, or just for the pleasure of recording old timers' memories, is eligible if it is based on some facet of history

in British Columbia and bears the copyright date of 1983.

Please send a copy of your book with your name, address and telephone number to: British Columbia Historical Federation, c/o N. Miller, Box 105, Wasa, B.C. V0B 2K0

There will also be a prize for the writer submitting the best historical articles for publishing in the *British Columbia Historical News* quarterly magazine.

Articles are to be submitted direct to: The Editor, B.C.H. News, 1745 Taylor Street, Victoria, B.C. V8R 3E8.

Submissions are welcomed at any time. Contest closes on January 30, 1984. Winners will be invited to the British Columbia Historical Federation Convention in Vernon in May 1984.

Mrs. Naomi Miller,
Vice President,
British Columbia
Historical Federation

STILL STARS IN HER EYES

How many active teachers know of the beginnings of the BCTF in a personal way? Perhaps only a few.

When I was attending Normal School in the Spring of 1943, Mr. Charlesworth, Secretary-Treasurer, paid us a visit. Later that term I climbed to the upstairs of an old West End Vancouver house to talk to him and to his secretary, Miss Charlotte Clayton. All the work of our federation was done by those two people from those two rooms.

At Easter time the following year I went to the Annual General Meeting. Any teacher could go in those days and any teacher could vote. I attended for many years after that, but this first time, I wanted especially to hear the guest speaker, Mr. Tat Boyes, who had been one of my Normal School instructors. During his speech Mr. Boyes said something about me, although he never used my name. "The young girl who has come down from her mountain with the stars in her eyes," he said, and that was me! I loved teaching!

I am retiring in a few weeks but I still have stars in my eyes over teaching — tears, too, at times, both then and now. I am retiring but I am not ready to give up my calling, only to have a change. So I shall become a volunteer hospital-homebound teacher. I look forward to this new challenge.

We teachers are among the luckiest people in the world. Our work is exhausting and frustrating sometimes, but it is never dull, often exhilarating, and certainly rewarding. We have the sure knowledge that we serve. If I were starting again, I should still choose teaching.

My only wish now is that younger teachers might have the opportunities that I have had to meet and know BCTF personnel, school trustees, and Ministry of Education people. It makes a difference. I have not always agreed with what these officials have said and done (and have told them so on occasion!), but I respect them and their different points of view. We must discuss educational matters.

I believe that, while those who are no longer in direct contact with children and schools may lose touch, still, with rare exception, they have education and children's best interests at heart. They, too, serve society.

Jean M. Norris,
Vancouver

PARADISE FOUND

We are Americans who have made our home in Latin America for seven years. Since 1981, when you published my last letter, we have seen much distorted news of the Americas coming out of the U.S. and would like to set the record straight for B.C. Teacher readers.

When we first moved to Costa Rica, bag, baggage, grandmother, teenagers and pets, we spoke no Spanish and knew little about the country. But, soon, our rural neighbors accepted us and graciously taught us their language, culture, and how a city-bred family could enjoy ranch life in a foreign land. Our delightful adventures there merit a book, at least!

My husband's love for the sea (Pearl Harbor survivor, retired Navy), prompted a further move two years ago, to Colombia's Caribbean coast. We found a lovely, old coconut plantation on the Pan American Highway near Santa Marta, the oldest (457 years), most fascinating city in all of the Americas.

Imagine, green palms waving in gentle ocean breezes, blue sea and sky, pounding surf and golden sand and, towering 19,000 feet over all and snow-capped the year 'round, majestic Mount Colombus. We feel we have much — incomparable beauty, fine neighbors, perfect climate, a stable, democratic government and a satisfyingly-low cost of living.

Like Colombus, we have discovered a new frontier, with a vast potential and, being human, are driven to tell others about our dream-come-true. If you are interested in the future of the Americas, and the Birds, write us by international air mail at Post Office Box 5222, Santa Marta, Colombia. It may take a while, but we promise to answer.

Juanita Bird,
Santa Marta, Colombia

SOFT DRINKS. THE HARD FACTS.

It's a fact that soft drinks are a part of the lifestyle of students. They should know what's in them. And so should you.

To give you and students the opportunity to learn the hard facts about soft drinks, the Canadian Soft Drink Association has put together a booklet called, "The Facts About Soft Drinks."

We're not suggesting that soft drinks are a substitute for proper nutrition. However, when they're taken in moderation with a balanced diet, they're a refreshing taste treat.

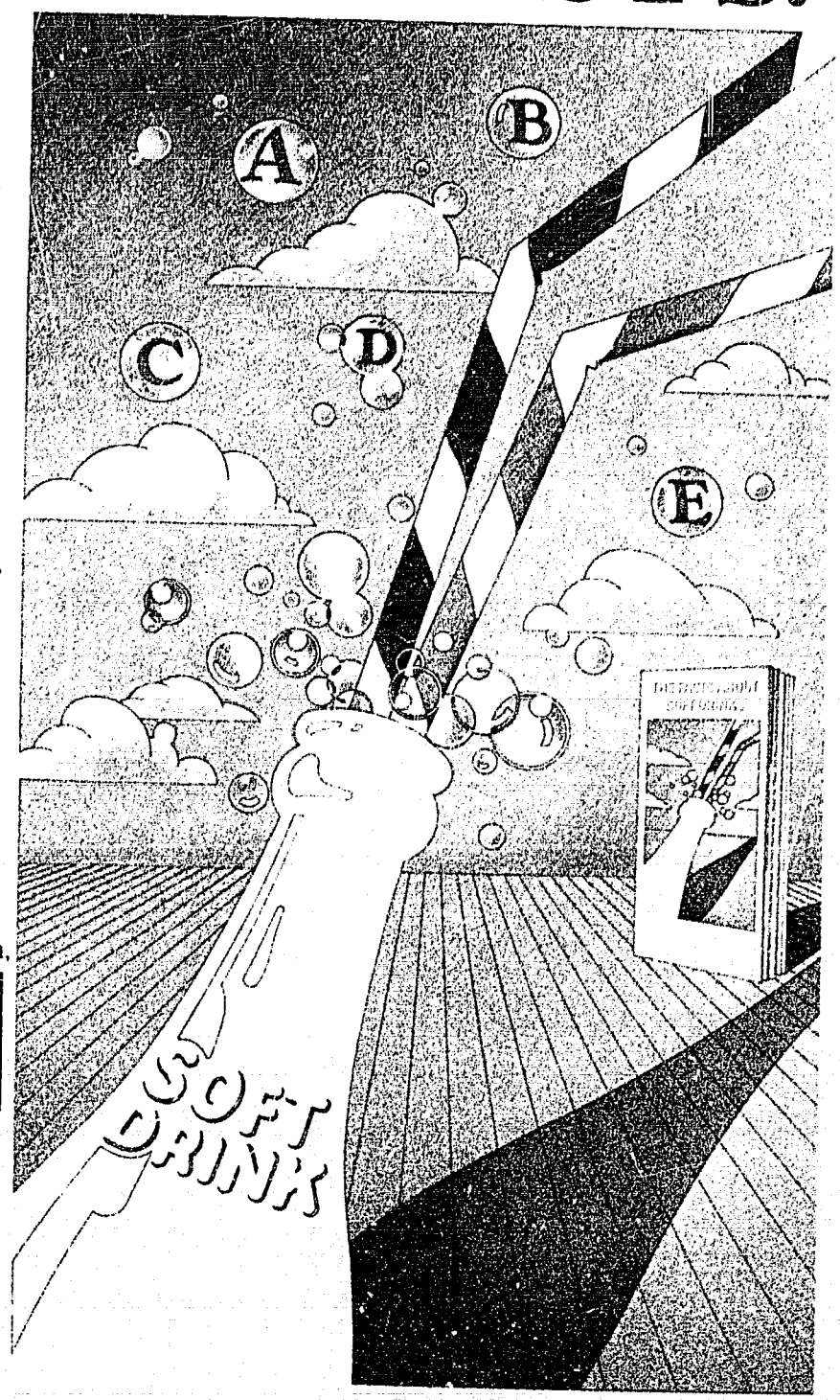
The booklet can tell you all about soft drinks: what they're made of, how they're produced, their history, diet implications and other important facts.

The booklet is free for the asking.

If you'd like to receive it or arrange for students to have individual copies, or if you'd like to know more about the soft drink industry, just drop us a line.

We'd like to give you the hard facts about soft drinks.

Canadian Soft Drink Association,
5th Floor,
443 University
Avenue, Toronto,
Ontario M5G 1T8.



SOFT DRINKS. ONE OF LIFE'S LITTLE PLEASURES.

THE EDITOR COMMENTS

KEN AITCHISON

The rapidity of technological change in recent years has been mind boggling. The developments in the computer field have been especially startling. Computers have already affected all of us significantly, and promise to reshape our lives even more in the years ahead.

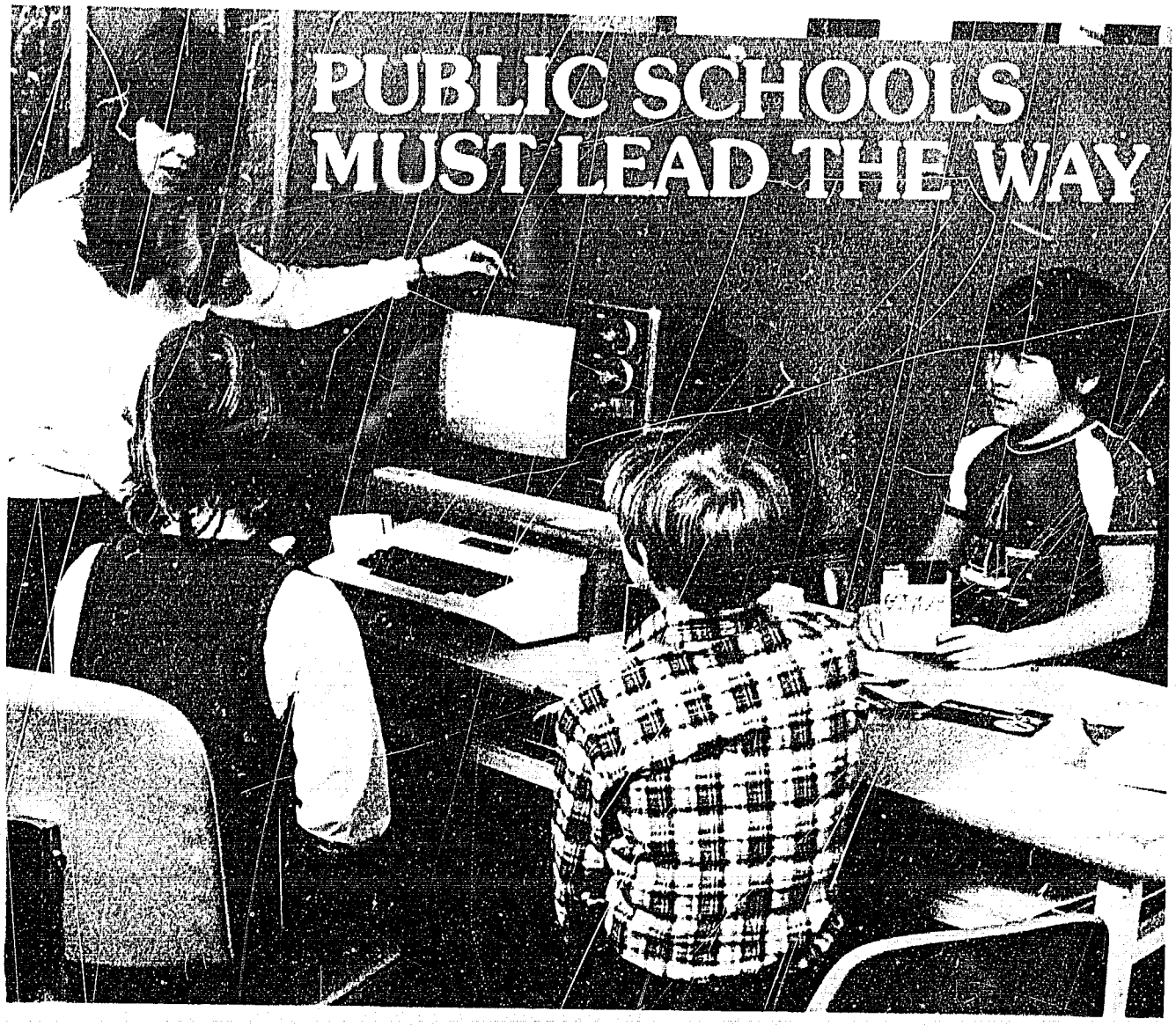
Fortunately, schools — often charged with being decades behind the times — have not ignored the impact of computers on society, and are trying, albeit to a limited extent, to prepare students to enter a world that in all probability will be dominated by computers. Indeed, it is probably not exaggerating to say that it will not be long before any student who graduates without being comfortable with computers will be illiterate.

Again fortunately, kids take to computers as ducks do to water. There is something about computers that captures the attention of young people. They become completely involved in working with computers, and often become oblivious to everyone and everything else around them.

This issue has been devoted to the place of computers in education. Within the limitations of the space available we have tried to present a series of articles that deals comprehensively with the topic, including some doubts about the computer phenomenon. In addition to covering the use of computers in the schools by both students and teachers, we have a look at the problem of trying to counsel today's students as they attempt to choose careers for the technology-dominated world of tomorrow.

All of the articles were written before the provincial government announced its latest round of cutbacks in education. (Ironically, the cutbacks are part of a new education finance system that was made possible only by the capabilities of computers.) Regardless of the effects of those cutbacks, we suspect that the need to make our entire population — students and adults alike — "computer literate" will become ever more important in education.

Computers-in-education is one of the most important topics this magazine has ever discussed. We hope, therefore, that you will enjoy, and benefit from, reading this special issue.○



The public school is the only educational institution that is accessible to all members of a community. It must, therefore, provide computer literacy programs for all members of the community, not just students.

MIKE LOMBARDI

●The computer revolution is upon us and it is irreversible. It is truly astonishing that this revolution has permeated all walks of life in so short a period of time.

All members of society must be empowered with the skills to view the computer as a useful tool for adding to the quality of life rather than a fearsome challenger to their intelligence.

The public school is an integral and vital part of each community, and is freely accessible to all members of society. As such, the public schools have the potential to guide and lead the community toward computer literacy.

In naming the computer as machine of the year for 1982, *Time* magazine recog-

Mike Lombardi teaches at Viscount Alexander Elementary School in Coquitlam. He is co-chairperson of the BCTF's Professional Development Advisory Committee.

nized the computer as the start of the information revolution that will dramatically change the way people live, work and think.

The most recent generation of computers, the microcomputer, is portable, relatively inexpensive, reliable, flexible, and very powerful. In fact, the microcomputer may be regarded as the first quantum leap since the invention of the printing press over 500 years ago. Gutenburg II is an accurate title for describing this technology, which has the ability of placing the knowledge held in a library into one's pocket.

One of the challenges we face is the ability of society to deal with the fears that the microcomputer revolution generates. Will we be able to overcome the fear of the unknown, the fear of obsolescence or replacement, and the fear of dehumanization? One of our goals must be to turn these fears into challenges, so that technological revolution will be beneficial in adding to and raising the quality of life. Society must keep pace with the technology by increasing our capacity to assimilate and use new information.

At the present time most members of the community, including teachers, are computer illiterates. This is astounding in light of the *Newsweek* magazine prediction that 75 per cent of all jobs by 1985 will involve computers in some way. Although most things may seem the same from one day to the next, changes under the surface of life's routines are actually occurring at almost unimaginable speed.

Knowledge has been increasing in an unprecedented manner, but there has not been a corresponding increase in the rate of using and applying this information. It is becoming increasingly obvious that reading, although necessary, is no longer sufficient on its own to absorb, remember, and integrate research developments and findings. The microcomputer is a practical means of extending our capacity to process this information.

A MARVELLOUS TOOL

The microcomputer is the culmination of an evolutionary process in computer technology. It is a marvelous tool with special features that include increased storage capacity and computer speed, and improved versatility of function, permitting its use in industry, research, and education. Along with being small, portable, and inexpensive it can be used by non-experts and experts alike. It is self-motivating and is used in an interactive manner. It can calculate; store and use information; solve problems with speed and accuracy; communicate in words, pictures, and numbers; and it can maintain records and control equipment. It certainly has the capacity to replace most of the paper and pencil functions in our lives.

One of the purposes of the public schools is to prepare students to cope with a rapidly changing world. Computer literacy is clearly a need of the future. This form of literacy need not only proceed inside the classroom and it should not be directed only at students. Schools have a major role to play in helping to make all members of the community "computer literate."

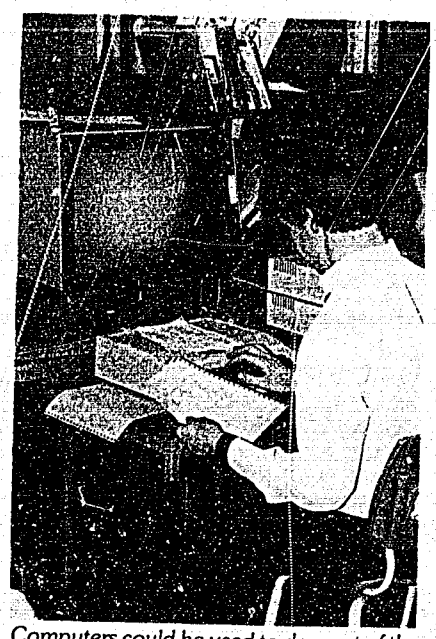
The school has the potential to serve as the springboard for the implementation of community-wide literacy programs. The school site is able to provide the computer hardware and systems at a reasonable cost. The instructional skills of trained teachers in each school could be deployed to bring computer education to all members of the community.

A typical day in a school could see pupils using microcomputers during the day, teachers using them for in-service education purposes in the afternoon, and parent groups in the evening.

A computer literacy program should provide for experience with the following:

- hands-on experience with computers;
- awareness/introduction to programming;
- familiarity with computer use;
- knowledge of the limitations and capacities of computers;
- knowledge regarding the impact of computers on society, including the moral and human issues.

The most critical element in establishing a computer literacy program is not the hardware or software, but the *headware.* This headware, or positive mind set, can be achieved only when people find the microcomputer familiar and comfortable to work with, when exposure to microcomputers is face-to-face, non-threatening, functional, and ongoing.



Computers could be used to do most of the paper and pencil tasks teachers have to do.

To move the public schools in this direction we must expand our vision of public education. The school should be viewed as a vehicle for empowering the community to cope with new developments and to solve problems. This direction means the active involvement of teachers, students, parents and other members of the community in an ongoing partnership. Teachers in the schools must play a key role in opening and maintaining the dialogue.

This involvement by the community and the school could be part of an overall effort to provide the optimum environment for school programs to be able to respond to the diverse needs of the community. It implies that interdependence and co-operation among the home, school, and community are essential.

IMPROVEMENT PROGRAMS

School-based computer literacy programs can serve as the initial step in the development of community-based school improvement programs. These programs would use the school building as the primary unit for school and community development. School improvement programs could provide for the systematic, participative process of problem solving and improvement as a regular, ongoing function with the school and community. These programs would serve as change strategies for school and community self-development and renewal. Citizen advisory councils, school staffs, and specially trained teacher-facilitators could be used to initiate this collaborative process.

Computer literacy programs must be provided by the public schools. The public school is the only institution that is accessible to all members in the community, regardless of religion, sex, socio-economic status, or race. The public school can provide for equality of educational opportunity for all in the community.

If the public schools are not able to provide the education required for the rapidly changing world, the private schools will certainly provide the service. We must not allow this to occur, because private school education would deny the vision of public education and would restrict access to those who meet the criteria of the particular institution.

The technology revolution provides us with at least two immediate challenges. Careful planning can help lead us toward a community of "computer literate" citizens and it can also start us on the road to a new collaborative process in which the public schools and communities work together to improve the educational opportunities in the communities.○

in the world of technology
WHERE ARE WE?

BARRY UNDERWOOD

Five years have passed since the first computers made their way into B.C. schools. Where do we stand today?

●How are we doing five years since the microcomputer pioneers moved in?

How far have we moved since Bill Goddard visited a conference in Detroit to see the Minnesota Educational Computing Consortium demonstrate the Apple II, or Harold Brochmann demonstrated his newly developed CAI (computer assisted instruction) package on PET at a summer conference of the B.C. Association of Mathematics Teachers? In those days the BYTE Shop didn't even sell Apples, and Paragon Computers didn't even exist. I was a microcomputer Johnny-come-lately, starting with an Apple only on September 1, 1979.

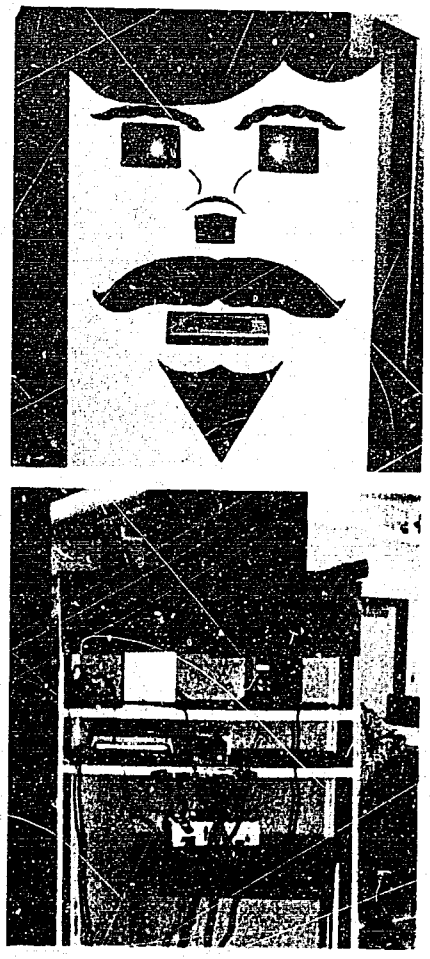
So, where are we now?

How many microcomputers are in the schools? According to a May 1983 publication titled *A Survey of the Use of Microcomputers in B.C. Schools*, by R. Jones, D. Porter, and R. Rubis of SFU, there are nearly 3,000 microcomputers. The breakdown by model is: Apple — 65 percent, Commodore — 25 percent and Radio Shack — 7 percent. But this is a picture of a moving target, and with the accelerating invasion of the technology, the number could easily reach 5,000 by this time next year.

What are we doing with these machines? The majority are in the secondary schools in computer science classes, but they are also in computer literacy units and business education classes. At the elementary level, about half the schools have a microcomputer. Here, they are used mainly for computer literacy, but with some use of CAI (both remedial and instructional mode). There is also a growth in the non-instructional applications: attendance, accounting, timetabling, test marking, grade calculations, and word processing.

How has the curriculum been changed by the microcomputer invasion? There appear to be pockets in the province where changes have been made. Some districts are phasing out typewriters from their commerce departments, while others are blending the microcomputer into their mathematics or English program. In the computer studies area, all curricula are currently locally developed, for there are no guidelines from the Ministry of Education for the use of microcomputers.

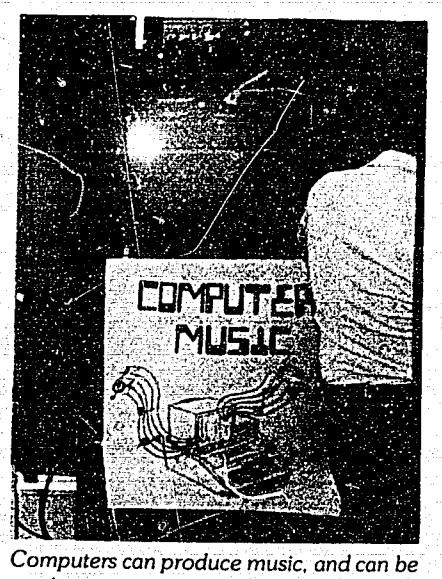
Barry Underwood teaches at Campbell River Junior Secondary School.



(Left) The front and back of a computer-man featured in an open-night display at Campbell River Secondary School. (Above) Some districts are replacing typewriters with computers. This Vancouver class is learning to use both machines.

How has the in-service education of teachers taken place? A wide variety of approaches has been employed. Some districts have used locally-assigned computer personnel while others have used other types of district personnel. Some teachers have taken courses from the universities or used the BCTF's Professional Development Associates, while others have gathered their expertise from the computer stores. So, although we may have some teachers who have taken very little notice of the effects of microcomputers in the schools, there are many who have made the "extra" effort in both time and money to update their skills in this area.

So, what are the trends toward the future? There appears to be little doubt that we are moving from an industrial society to a technological society. There are boundless examples of where the changes have occurred, ranging from computerized forest fire detection to computerized cash registers in our liquor stores. Some homes already have computers (how would you like to teach a computer studies class in which 40 percent of the students have a microcomputer at home?) and it is predicted that the trend will accelerate. What about the number of camps we had this past summer? Business is beginning to make a significant contribution to computer education, even though it may be restricted to those with the ability to pay.



Computers can produce music, and can be used to introduce students to music.

But inside the classrooms, what is the approach? With the increase in the number of computers (you really can't do much with one computer and a class of 30 students), many teachers are able to use the computer not in the "teaching machine" mode but rather as a tool to generate more creative thinking. For example, instead of the student's receiving a lesson, the student uses the machine to develop or discover the lesson. Instead of being given a lesson on nouns, the student using a computer can quickly write a passage, have it checked, and quickly alter it again and again until perfection is achieved. It is this approach that indicates the increased use of word-processing, LOGO, VISICALC, and data bases in the future.

In five years the number of microcomputers in the B.C. schools has changed from zero to 3,000, and the number of instructional packages has increased dramatically in both quantity and quality. But those are not the biggest or most important changes. The greatest change has been in us. We have learned that the computer is not an all-powerful machine that is going to control us, but a powerful machine that we can control to improve the education of our children.

And we are only beginning to learn. ○

Why Teachers Approach Computers Cautiously

Many computer programs for teachers have not been successful. It's time attention was paid specifically to the computer *needs* of teachers.

DORIS CAREY

Doris Carey formerly taught in Fernie. She is now at the University of Oregon, doing graduate work in computer science and education. She is also software review editor for *Computing Teacher* magazine, the journal for the International Council for Computers in Education.

Many educators feel that computer technology is being foisted on them too quickly. They are inclined to be cautious about computer use, pointing out that little is known about the effects of computers on children and their learning.

Parents and the general public, however, are urging prompt and abundant use of computers in education.

There are many theories about why the implementation of computer use in education has been so slow, in view of the increased availability and decreased cost of microcomputers. Some of these theories place the blame on the economy, yet most projects aimed at putting computers in the classroom have survived the budget cuts.

Other theories claim that the education establishment is stodgy and conservative, and paint a picture of tightly-drawn purse strings and closed doors. If we look at the rate at which schools are acquiring computers, it is easy to see that this is not the case.

Yet, although it is difficult to define, there seems to be some feeling that computers are not occupying a comfortable place in education. Computing remains an elective, a peripheral activity, reserved for special occasions or model programs. If children are at ease around computers and the machinery is increasingly available, perhaps teachers have not entered the computer age. It may be that many have taken the first steps, but have been unable to find an appropriate entry point into the educational computing world.

The computer entered the world of education at the student level. Programs were designed to meet the needs of children, and teachers were generally encouraged to allow them to blossom. The teacher's role was often one of non-interference. The problems that were given the most thought and attention were those of acquiring more and more machines and having more time available per student per week. Little thought was given to the education of teachers, and those that sought new knowledge were given the same introduction that kids were given, largely unstructured and definitely oriented toward the acquisition of programming skills.

One of the reasons that no one has called a halt to the practice of feeding programming in BASIC or Pascal to teachers is that there is a well-stated objective for continuing to do so. In the late seventies the only educational software available to students and teachers was that written by teachers willing to become pioneers in the area of software production. Many of these educators, often aided by armies of student programmers, developed primitive, drill-and-practice programs in the fields that were easiest to tackle: mathematics and vocabulary games.

No one can doubt the good intentions of those who fought to incorporate computers in education, but it is easy to dismiss their work because it lacks the polish and pedagogical excellence of today's productions. Indeed, it has become quite fashionable to dismiss most educational software as drill-and-practice mathematics, and not to look closely at the latest trends in the education software market.

In an effort to solve the problem of scant software selections, organizers and innovators encouraged all teachers to become programmers. Considering the lack of other objectives and the needs expressed in these areas, the objective was worthy. Those who struggled with defining computer literacy for teachers naturally felt that it was desirable for teachers to be able to tell computers what they wanted them to do. Programming was at the core of literacy for teachers.

Designers of computer education for teachers felt that they would use the hands-on approach that was so successful with children, especially reluctant learners. It was thought that children felt that they were in control of computers, and that this positive effect would transfer to teachers. Educators attended conferences and workshops where they spent up to a full hour on hands-on introductory activities, filling the screen with their name by typing in a three-line program copied from the blackboard. They learned that silicon chips were tiny and that complex calculations were done in microseconds.

Teachers have followed the dictates of computer salespeople.

Then some months went by, and they attended more sessions and seminars where the same introductory programming was repeated. Somewhere, teachers were turned away from computing. They were not sure what computers could ever do for them, but they felt sure that programming in BASIC was not it.

Meanwhile, students' needs were being met by educators who offered elective courses in computer science in secondary schools. Typically, one of the mathematics teachers had had one or two courses in Fortran and proceeded to learn BASIC easily. In some districts, teachers with three courses became the resident experts and were given promotions to computer co-ordinator or curriculum developer (Gring, 1982).

As public demand grew, short courses were offered in junior secondary; they often included a few hours of computer work, and some time spent on the history of computing, the silicon chip, the bit, the byte, and the bug. More teacher time was needed to cover these goals, so these units were either incorporated into mathematics classes, or offered as mini-courses.

When it became clear that computer exposure was desirable for all students, and that introductory computing was to be offered as early as the primary grades, new problems arose for teachers. The first was the redefinition of the core knowledge of computing that should be required of all teachers. Surely, as students acquired increasing knowledge about computers in their 12 or 13 years in the public school system, teachers should have at least that much knowledge themselves. It became necessary for teachers to become familiar with hardware and history, simply because these became essential components of the education of children.

The second problem faced by educators was the organization of curriculum. Teachers were not only responsible for the content of courses, but also had to figure out what they should do with students who entered Grade 7 with two or three years of computing experience. Is there any important body of knowledge between hardware-and-history and programming? It seemed as if the only possible choice was to prepare to teach programming at the elementary school level, so a further urgency arose for preparing teachers to teach programming.

No one stopped to ask what the benefits of programming were for children. No one examined the effects of learning programming from teachers who had minimal instruction in this area. No one asked teachers very much at all because, in general, the people who were pressing for implementation of these programs were teachers themselves. The mystique grew.

As time went on, the problems became more complex and diffuse, but the machine that was causing the problems was also the tool that held some of the solutions. The difficulty of software production was eased by a new phenomenon in program cre-

ation: authoring languages. These new languages were easier and faster to learn than BASIC, and they refined the process to some extent.

Unfortunately, the product of the authoring language was not much more sophisticated than its predecessor, and teachers did not invest the time and money into acquiring the skills needed for mastery of these tools. The public feeling that teachers should use computers to meet their students' individual needs was reinforced by the existence of tools that would do the job so quickly and easily. Teachers continued to see computers as an increased burden.

Further developments in technology gave access to more and more people. Secretaries and businesspeople used word processors, spreadsheet programs, and databases to make the transmission and acquisition of information fast and efficient. Millions of dollars have been spent on research to assure that the needed skills for operating the electronic tools of today's businesses would be fast and easy. The newest computers have built-in functions that can be mastered in less than an hour.

Retailers of computing machinery have had much to say about public education. They have recommended programs and hardware for business and industry. They have designed systems for offices and for home use. They have counselled educators and children. Many have opened their stores as auxilliary classrooms for the benefit of the consumer.

Teachers have generally followed the dictates of the computer salespeople. They are convinced that the key to computer literacy lies in the microcomputer marketplace. Other teachers have approached summer school offerings, expecting a potpourri of applications, and generally assuming that the same options offered by the retailer would be available in the university at a more palatable price. In general, non-educators have set the curriculum.

UNSUCCESSFUL PROGRAMS

The time has come to evaluate the programs for teachers, and realize that many of them have not been successful. Teachers sought an entry point into the world of computing, and were met with a barrage of jargon and whiz kids who quickly alienated the adults who timidly stood back, basking in the mystique of microcomputing. It may be that we are approaching the problem from the wrong angle.

Few people who use computers do so unless they have a specific need. Children who own computers use them for recreation or as a hobby. Businesspeople use them to solve problems and manipulate masses of information. Scientists use them to save time and handle complicated formulae. Teachers who have computers in their classrooms rarely use them, and when they do, the machines are used for the direct benefit of children.

If computers are going to be used by teachers, they must be used to meet real needs. In 1980 Tony Flanders did an extensive survey of teachers' needs and feelings in B.C.* The first most important need reported by teachers was for more time. Most teachers would have no trouble defining their specific needs in terms of time. If a computer and the appropriate programs were available, teachers could learn to use computers as tools to aid them in clerical work, report writing, test generation, record keeping, calculation, and many other tasks.

"I imagine there was the same excitement when they invented chalk." Cartoon reprinted with permission from the ***ATA Magazine.***

Teachers must be given the means to recognize which tasks can be turned over to the computer. To do this, the teacher must have some feeling for the function of the computer. Dependence on outside sources for the initial experience has been a dismal failure. It may be possible for teachers to find a new way in to the world of computing by means of personal experience.

For example, new programs on the market allow skill in word processing after one hour's instruction. Of course, these programs are known as child-appropriate word processors, simply because the microcomputing world has been largely the child's domain up to now. But the label should not deter any adult from gaining skills in this area.

The first practice a teacher gets with this new tool may be to generate letters, all of them edited versions of one basic text. For example:

October 15, 1983

Dear Mr. & Mrs. Smith:

Our class has been studying insects in science this term. Next Wednesday we shall be going to Montainview Park to observe insects in their natural habitat. We shall be outdoors from 9:00 a.m. until noon, so Jill should wear warm clothes or rain gear to school, depending on the weather.

Report cards will be issued on November 6. Jill has been doing satisfactory work so far, and has handed in all but two assignments on time. Her behavior has been excellent.

Please feel free to call me at 555-5555 if you have any questions.

Yours truly,
John Jones,
Pleasant View Elementary School

That is a typical letter to parents, one that could be altered in less than three minutes to result in a personal letter to another parent:

October 16, 1983

Dear Mrs. Brown:

Our class has been studying insects in science this term. Next Wednesday we shall be going to Mountainview Park to observe insects in their natural habitat. We shall be outdoors from 09:00 until noon, so Darren should wear warm clothes or rain gear to school, depending on the weather.

Report cards will be issued on November 6. Darren has been doing excellent work so far, and has handed in all assignments on time. His behavior has been satisfactory.

Please feel free to call me at 555-5555 if you have any questions.

Yours truly,
John Jones,
Pleasant View Elementary School

The skill of editing text such as that shown above has several advantages for teachers:

1. It is a skill that can be acquired quickly, and with minimal coaching (some programs provide their own tutorials, built into the program).
2. It is a skill that has myriad uses, including personal correspondence and production of academic papers.
3. The skill transfers into the classroom: it can be used for creating reports, generating tests, writing letters to parents, etc.
4. The skill can be transferred, in some cases, into the teaching/learning environment: these are skills that can be taught to students in many classes.
5. After a few weeks of use, the educator will be largely "computer literate," have some facility with basic terminology, and

*The Professional Development of Teachers, published by the B.C. Teachers' Federation.

have enough knowledge about computers and programs to discuss further uses confidently.

Once the first barriers have come down, there are many uses teachers can investigate for continued growth. What is important is that the mystique be dissolved quickly and painlessly. Then teachers will have the knowledge and confidence to design their own learning experiences.

Programs are available that are specifically designed for teachers' use. They are collectively known as teacher utilities, and range from test generation to grade calculation and attendance/record-keeping. These may not be the only types of software that teachers will want to investigate once computers have become useful tools in their own right, but they may help to solve the more immediate clerical problems that take up teachers' time.

ONUS ON ADMINISTRATORS

Teachers do not generally spend money on gadgets that make their workplace more efficient. They rely heavily on the decisions made by school administrators to determine what kinds of equipment and supplies they will have in their classrooms. For this reason, the onus lies on school administrators to provide the time and tools for teachers, if they have any intention of eventually promoting computer use in their school. Teachers must be able to count on some time, away from students, so that they may master some of the required skills. Even one computer in a busy school lies idle for some hours, especially on weekends. The principal could see to it that the computer goes home with one teacher each weekend until all feel relatively comfortable with it. If principals and computer-using teachers continue to maximize student use, this will not be possible. However, the priorities must be defined clearly.

Having the opportunity to try a computer, however, is not enough. Programs must be made available. Most of the programs that would be useful to teachers are available for less than $100, many for half that. Staffs must be willing to work out the mechanisms for computer use if the computer is to be used as a utility. There are many variables to consider, but continued use is hopeless unless budgets and schedules are arranged with teachers in mind.

Finally, organizers of in-service education experiences for teachers must take the time to analyze the goals and objectives of their offerings. It is not uncommon to hear leaders of computer education sessions state that they will continue to offer programming instruction as long as teachers continue to demand it. "Teachers want to learn programming," they say, "so we continue to offer it." Unfortunately, since programming appears in every catalogue, every conference, and every in-service education session, one can hardly blame teachers for believing that programming is fundamental to computer use.

There is no denying that there are many wonderful possibilities for using computers to enhance the education of children. But the time has come to see the computer as a tool for adults too. Different people have vastly different reasons for enjoying such activities as reading, gardening, skiing, or travelling.

Teachers should have similar choices with regard to computing. Some will enjoy arcade games and programming. Some will appreciate the relief from clerical tasks. As long as teachers feel they can enjoy using computers, let's give them a choice. ○

WE SHALL MISS THESE TEACHERS

	Last Taught In	Died
In-Service		
Helen R. Elliott (Noel)	Peace River North	September 29, 1981
Lyla J. Manus	Vancouver	January 31, 1983
Janet Naegele	Vancouver	February 19, 1983
Shari F. Podersky	Saanich	April 10, 1983
Margaret Ralph (Mulligan)		February 11, 1983
Retired	**Last Taught In**	**Died**
Vera A. Anderson	Vancouver	February 21, 1983
Clara Barker (Smith)	Port Alberni	April 18, 1983
Jennie Benton (Stevenson)	Kamloops	January 4, 1983
Mary Bergen	Chilliwack	June 3, 1983
Stephen Brynjolfsom	Powell River	June 17, 1983
May S. Campbell (Croft)	Victoria	December 18, 1982
Frank L. Cupit	Vancouver	March 22, 1983
James B. Densmore	Victoria	May 9, 1983
Margaret Faulkner (Main)	Vancouver	April 1, 1983
Elaine Gormely (Spencer)	Vancouver	June 4, 1983
Belle Gratton (Young)	Sechelt	April 29, 1983
Dorothy Grimmer (Durick)	Gulf Islands	December 17, 1982
Margot Gryzwacz	Revelstoke	March 23, 1983
Agnes E. Henning (Potter)	Victoria	February 4, 1983
Pauling M. N. Hewat (Downey)	Vernon	February 24, 1983
Alexander Holmes	Surrey	March 20, 1983
Elsie Johnson	Vancouver	May 22, 1983
Eugene Laird	Courtenay	July 12, 1983
Nicholi J. Kroeker	Hope	January 20, 1983
Sheila W. Livingston (Tapley)	Kamloops	May 16, 1983
John P. MacLeod	Vancouver	June 18, 1983
Ronalda McCaul	Vancouver	March 21, 1983
Donald N. McKay	Cowichan	February 2, 1983
Ethel M. Millard	West Vancouver	March 24, 1983
Myrtle E. Milley	Vancouver	May 6, 1983
Muriel Mould (Chapman)	Burns Lake	March 24, 1983
Gladys Partridge (McLauchlan)	Grand Forks	April 29, 1983
Fred H. Perfitt	West Vancouver	May 18, 1983
Albert Richter	Saanich	May 21, 1983
Margaret El Ridland	Vancouver	May 5, 1983
Marg E. Roberts (Ashby-Dalin)	Cowichan	August 6, 1983
Erich Schulz	Pacific Vocational Inst.	May 19, 1983
Charles M. Senay	Grand Forks	May 17, 1983
Karl H. Siegler	Vancouver	February 1, 1983
Alice M. Spraggett	Chilliwack	May 15, 1983
Herbert A. Thicke	Nanaimo	February 3, 1983
Ethel M. Thompson (Grager)	Peace River	April 4, 1983
William N. Warner	Maple Ridge	February 8, 1983
Marjorie Wellwood	Vancouver	April 29, 1983
Winnifred White	New Westminster	June 30, 1983
Arthur F. Wilks	Vancouver	March 16, 1983
Ivy M. Youell (McMahan)	Saanich	June 3, 1983

Computers Have Really Turned on Our Students

LEE VENABLES

Those amazing machines have done something nothing else has been able to do as well — capitalized on the natural curiosity of our students. The results have been exciting.

School had ended a half hour before. I was at computer 3 helping a student before he caught the last bus. Other students were at computer 2; Sean was at Computer 1, by the back door of my science room.

The door opened and the replacement custodian came in. He swept the back of the room then returned to Sean's computer and, leaning on the handle, watched Sean typing madly at the keys.

He stood there for a few seconds then asked Sean, "You like these computers?" Screech!!! Sean stopped. He glanced up at the strange adult, surprised that he was being asked a question, said "Yes," and promptly returned to his computing. Tick. Tick. Tick. RUN. LIST.

Most adults would have been taken aback by this rather curt dismissal but the custodian asked one further question. In an almost conspiratorial manner he leaned down and asked, "Doesn't it hurt your eyes, working on these things so long?"

Screech. Sean stopped, looked sideways at this adult who kept interrupting him and said, quite simply. "No." The custodian was satisfied. He continued with his work. Sean returned to his programming.

This story illustrates the distance between adults, who generally still view the computer with awe and distrust, and our children, who see it as a fascinating machine, or tool. I'm going to describe how we have applied, and could further apply, computers at Cedar Junior Secondary School in Nanaimo, to overcome the doubts of our staff and encourage computer use by our students. Before I do that I'd like to provide some background on the computing courses we offer at the school and some ideas of my own about the burgeoning computer field.

Cedar Junior Secondary is a small rural school of 270 students (Grades 8-10) just south of Nanaimo. Through my initiative and the encouragement of the principal, I developed a 23-hour computer literacy course that has become part of an elective program for all Grade 8 students. The other courses in that package include woodwork, foods, guidance, and business education. Since the computer literacy course was the first of its kind offered in Nanaimo I had to go to the Nanaimo District Teachers' Association's Curriculum Committee, the school board's education committee, and finally the school board itself before final approval was granted. That was 1982. Last year, with the support of our new principal, I developed a Computer Scence 9/10 course for Nanaimo that went through the same approval procedures and was given the go-ahead for September 1983.

A great deal of the philosophy and organization of the 9/10 course comes from Ed 555, a curriculum course from the

Lee Venables teaches at Cedar Junior Secondary School in Nanaimo.

(Top) This boy is learning how to use the computer for word processing. (Bottom) This boy is trying to find the program he wants on a disk.

University of Victoria, offered in Nanaimo over last winter. The course required us to do three major reports, so I did all mine on computers: computer literacy courses, the importance of computers in education, and the theoretical support for computer studies from such major psychologist/philosophers as Piaget, Papert, and Dewey.

In the course of researching those reports I must have read well over 50 articles in publications ranging from *The Computing Teacher* to *Creative Computing* to *The Journal of Science Education*. The time and consideration I gave to those readings is reflected in the two computing courses I have developed. Both my Computer Literacy 8 course and the Computer Science 9/10 course reflect educational theory regarding learning, practical management in a classroom, and organization to maintain the interest of the students.

I see computers as serving three broad functions in a secondary school: (1) work training tool — word processing skills, graphics design, business education applications; (2) management tool — administrative duties, computer assisted instruction and management, and (3) learning tool — the ability to program a computer requires logical, problem-solving skills. I shall now discuss each of these applications in turn.

There is no denying that society and the workplace are changing. There are fewer jobs in the manufacturing and resource fields, more jobs in information and service industries. Information, as a workable commodity, requires technology that can store, manipulate, and "output" that information. Computers do all these tasks easily. Wherever information is being channelled and used computers can be easily applied. Their application requires some individuals who can program the computer properly to do exactly what the system is designed to accomplish. Once the system is on-line, many more people will be using the machine to process information. The new technology will demand that people be comfortable using computers. Far more people will use the technology than are needed to program the machines. Intelligent users, both young and old, are needed.

Teachers must accept that they will be users too. Distrust of change must be tempered with an acknowledgement that computers are, and will continue to be, in our schools. Unlike previous technological innovations like the overhead and movie projectors, computers have a broad range of applications and, most importantly, they are available to the business and home markets. All of us need to be "computer literate," comfortable working with these machines, and knowledgeable about their potential and limits.

As part of this direction we introduced a computer literacy course in Grade 8 at Cedar Junior Secondary. Every Grade 8 student takes the course, which lasts 23 hours and has three major themes. During the first half of the course students learn to use the computer as a tool. Students create: (1) text — using a word processing program; (2) shapes — using a high resolution tables program, and (3) songs — using a music program. The middle topic of the course requires students to read magazines and books to discuss computer influence around us. Finally, students learn how to program the computer.

The major programming assignment is to create a low resolution design. The course emphasizes hands-on experience with the computer and creation of new works by the students. The computers allow the students to create something of their very own — a skill that I find lacking in too many other traditional courses. Judging from the enthusiasm of the students, they thoroughly enjoy these assignments. They get a particular thrill from showing their designs to their friends. Many a time I have watched a student drag in his or her friend and boast, "That's mine," as the design colors the screen. I don't see that too often in math or science.

The eagerness of the students to compute does not come from a strong sense of training for the job market or keen interest for grades — we are talking about 13-year-olds here. They are curious. When they have an opportunity to communicate with a machine on an "intimate" basis, new and exciting things happen. Students engrossed in computing often lose perspective of time and place. Now, this isn't bad — just very, very interesting. I have been perplexed over this phenomenon, but maybe I shouldn't be because it happens to me too.

The core of the experience is the intimacy that one develops with the machines. As a machine, a computer only responds to instructions. If difficulties arise, students don't give up in a huff of exasperation. Judging from student behavior in other classes, the frustration level is very low. With computers, however, students will remain at the keyboard for a very long time, trying different solutions to problems. I ask myself what is so special about computers that can generate the intensity of concentra-

tion that is so apparent in many children. The core of the experience seems to be the intimacy that develops with the machine and the continuing challenge to communicate with the computer.

Oblivious of their neighbors, students remain glued to their machines until forced off by others or the bell. It is this capacity of computers to capture the attention of students that deserves much more attention. Because there is only a limited number of computers in my room, students in the computer literacy class have less than 10 minutes each period to work on assignments. Any student wanting more time can come in before school, during lunch, or after school until 20:00 each weekday. We have been very fortunate at Cedar in having a custodian and administration that support the open access policy to computers that the students enjoy.

The use of computers in computer literacy and computer programming courses has obvious applications for a school. Our challenge at Cedar is to apply computers wherever they can be useful in the school. For instance, we are working with an attendance/demographic package now that will alleviate the tedium of doing registers. The computer will record absences, print an absentee sheet, and balance the register. Locker, division, grade, and alphabetical lists are all possible. Computers can be applied wherever routine tasks are required and large banks of information are being manipulated. If you can't develop the program for the computer, welcome to reality, but there are software programs out there that will do the task more than adequately.

Our librarian recently approached me about how computers could be used in the library. I rambled on about ordering, book withdrawals, inventory, classification — the library is a perfect place for a computer, all that information about books that needs to be stored and reclassified in different ways. Our librarian, Gerry Boulter, had an easier task for me. The vertical file had heaps of folders that were too disorganized to be of any assistance to students. Enter Organizer 2, a list handling program, and after two hours we had an alphabetized list of files by subject and dewey number. Gerry couldn't have been happier. Face beaming, she waved that list all the way to the staffroom.

Another important function of the computer in the school is in the field of computer assisted instruction (CAI), management (CMI), or learning (CAL) — all pieces of the same pie. This field has the most potential for computer application in schools. Essentially, it frees the teacher to circulate and assist individual students. Good CAI materials not only lead students through a lesson but record their responses and evaluate their progress. This type of software requires a great deal of skill to develop. There are many drill and practice programs available, especially in mathematics. Students who require more assistance in fundamentals can use these programs, which often have a game format. Computers are very good at providing repetitive sets of questions.

These girls are writing programs for Computer Studies 8.

Limiting computer use to drill and practice, however, seriously underrates the capacity of computers to instruct students by means of a variety of techniques. Excellent CAI materials can, and will, be developed. Software can be designed to instruct students in a tutorial or simulation mode but it has to be more affordable and of better quality than what exists now. This type of program requires a large number of sophisticated techniques that maintain student interest for extended periods of time.

At present there is a shortage of skilled educators who actively seek to integrate computers with the curriculum. Part of the blame may lie with inadequate facilities, since the cost of computers still remains artificially high. The cost will continue to come down so the other major shortage, that of good instructional packages, will be the next major area of concern.

Very soon, computers will be able to individualize instruction, or provide drill and practice for nearly every course. The advantage should lie with us, the teachers. We shall be able to provide additional practice exercises for slower students, enrichment for all students, and individualized instruction either by computer or by teachers, freed from more tedious tasks. Good CAI materials have a long way to go but if educators provide an open attitude toward their implementation, better software will be developed sooner for the benefit of us all.

One rationale for computer implementation in education has been the need to prepare students with skills that they will need in the workplace. Another rationale has been that computers can assume many of the duties of educators — registers, lessons, drill and practice, inventories, etc. However, I believe that there is a more important reason for introducing computers in our schools, particularly in the secondary school system.

The days of teaching the classics and Latin, a content-based curriculum, have long been laid to rest. Thankfully, the material covered now and the method of teaching have some basis in educational theory. The learning theory that has enjoyed the most support for the last 15-20 years in North America has been the theory of learning proposed by Jean Piaget. One of the major stages in a child's cognitive development is that of logical thought. Children should be able to abstract and deduce patterns from their environment.

For the average student this stage coincides with the entry into secondary school. All computer languages, and in particular a new language — LOGO* — are structured to develop these logical, problem-solving skills. Any activity that encourages the development of these logic skills is very valuable for the secondary student. Since abstract thought is still developing, it makes sense that we should provide facilities to enhance student mental growth.

Computers can do this. Computer languages, particularly the modern languages like PASCAL and LOGO, are designed to develop problem-solving skills. These skills are not limited to math and science although these departments often control the computer facilities. Surely the development of abstract thought is transferable beyond the bounds of a single discipline. The ability to isolate patterns and to separate large problems into workable parts is a valuable skill that computers can develop in our young people. This is another significant role of computers in school.

If we look back to Sean's experience with the custodian, we can now appreciate the humor of the situation, with its more sobering overtones. Sean, as well as the rest of Cedar's computer club, represents a different kind of thinking by some of today's students. They are not bouncing around in sweats or taking time from school for any number of extra-curricular activities. These students are fascinated by activities that are supposed to be the core of education — thinking.

That's what excites me about computers — students intrigued by thinking. ○

*See the next article in this issue.

LOGO

an alternative approach to computer education

This simple, easy-to-learn computer language is great for developing thinking skills.

DAVID PORTER

●To link the use of computers in education with terms like "courseware" and "delivery system" is to confirm the worst fears of many educators.

That the efficient delivery of facts and information has become a primary objective of the education system runs counter to a philosophy of education that seeks to make learning an active process and primarily learner-driven.

Is it possible, then, to make use of computer technology to make learning a self-empowering process for the individual?

The computer programming language Logo encompasses a philosophy that seeks to do just that. Teachers who are familiar with the Logo computer language already know that it is an easy to learn programming language, with wide appeal at both the elementary and secondary levels, and that it is a powerful tool for developing general problem solving skills.

David Porter, a North Vancouver teacher, is a part-time consultant to the BCTF on educational technology.

Logo is becoming widely used in schools throughout North America and is catching on quickly in British Columbia. In fact, many teachers have taken advantage of summer courses designed to give them an understanding of the language as well as a methodology for classroom implementation.

What, then, is the appeal of Logo?

LET'S TALK TURTLE

The strength of the Logo philosophy, of which Seymour Papert* is the spokesperson, is its view of learning as a natural, personal process. Papert sees children as naturally curious and inquiring, capable of theorizing about their world from an early age. To this end, he has designed a variety of computer-controlled devices, robot animals (turtles) and music generators, to provide children with a sense of power over technology and over ideas in general.

Papert set out to fashion the computer into a "convivial tool" for children. He eventually provided them, through the Logo language, with a powerful tool for integrating computer technology with human thought.

Generally, Logo users approach the language by directing the movements of a turtle, a computer graphic object whose movements are easily controlled through keyboard commands that are entered in easy to understand English (or French). A turtle can move FORWARD and BACK and can turn RIGHT or LEFT. It leaves a trail behind it as it moves about the screen and invites the young programmer to design and draw complex shapes on the computer screen.

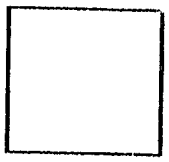
* Papert, S. *Mindstorms: children, computers, and powerful ideas*, New York, Basic Books, 1980.

SOME EXAMPLES

Logo is an interactive programming language. In immediate mode, commands typed at the keyboard are immediately

executed. For example, a square can be drawn with the following commands:

```
FORWARD 50
RT 90
FORWARD 50
RT 90
FORWARD 50
RT90
FORWARD 50
RT90
```



FORWARD instructs the turtle to move forward a specified distance (in this case 50 turtle units). The RIGHT command tells the turtle how many degrees to turn in that direction. For very young children, keyboard exploration with the turtle can be modified to include only single keystroke commands.

The REPEAT command takes the Logo programmer to the next level of sophistication with the language. The square that was programmed above can also be programmed with the following REPEAT command:

```
REPEAT 4 (FD 50 RT 90)
```

Programming in immediate mode usually occurs at the exploration stage of Logo programming. However, it does not take long for children to discover a better way of instructing the turtle using program mode. In this mode, it is possible to "teach" the turtle new commands. For example, the turtle can be taught to understand the command SQUARE. Using the TO command, the teaching process begins:

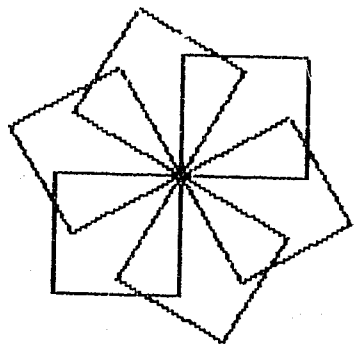
```
TO SQUARE
REPEAT 4 (FD 50 RT 90)
END
```

Using the command SQUARE will now cause the turtle to execute a square at any time. The names selected for these new commands (called procedures) are the choice of the individual programmer. SQUARE could just as easily have been named BOX or SHAPE.

Logo allows its users to start thinking of designs and shapes that are made up of previously named procedures, very much like using building blocks to make a castle. A previously defined procedure such as SQUARE can be used to create a more complex design.

```
TO DESIGN
REPEAT 6(SQUARE RT 60)
END
```

will produce this rotated square design.



The graphics capability of Logo in the hands of students who are free to experiment with it gives rise to unlimited possibilities. However, Logo use is not confined to graphics and it can be used to explore many mathematical relationships using numbers. Language arts and music are also supported by the language and it is not difficult to turn Logo into a simple text editor (word processor) or music generator.

LEARNERS AND LEARNING

Logo's simplicity is especially obvious to a novice user who has had no experience with other programming languages. The Logo language is easy to learn. It has a rich set of primitive commands and a vocabulary that can easily be expanded through the creation and naming of new commands. This naming process gives the language its power, and makes it very accessible to young children.

Naming brings the language as close to interactive, natural-language processing as is capable with current technology and personalizes the language to a degree not found in any other computer language designed for children. From the standpoint of learning, being able to analyze and name processes is a powerful idea indeed.

Learning by doing is a central theme in Logo. It is designed to promote the problem-solving strategy of breaking complex problems into smaller, more easily solvable units. The term "procedural thinking" is applied to this skill and Papert likens the process to reducing a problem to "mind-sized bites." The computer environment provided for children allows them the opportunity to explore, theorize, and to make mistakes (bugs). The visible graphic symbol, the turtle, is the object with which children can explore and exploit their intui-

Continued on page 24

THE COMPUTERS IN EDUCATION PROGRAM

●The BCTF's "Computers in Education Program" was initiated over a year ago as part of professional development services. Sixteen teachers from various parts of the province who had experience and expertise with microcomputers were selected as computer resource teachers. The purpose of the program was to provide in-service education activities to teachers in schools as well to school districts on special PD days.

Because of the cutbacks and restraint in education in 1982-83, these computer resource teachers had few opportunities to meet and work with teachers. Nevertheless, several resource teachers were called on to provide workshops in Prince George, McBride, Qualicum, Halfmoon Bay, Abbotsford, Parksville, and North Vancouver Island. With specialized expertise, the BCTF resource teachers were able in each case to augment the talent in the district or to provide new information on computer applications.

BCTF computer resource teachers are again prepared to bring in-service programs to schools and school districts in the 1983-84 school year.

Three new directions will be taken:

• Teacher In-service

Available on request are: school-based or district-based workshops, weekend computer fairs, jointly sponsored computer institutes with school districts (such as the successful Computer Institute conducted in Burnaby in July), or, if possible, in-classroom demonstrations and assistance for teachers.

• Electronic Networking

An electronic network test using the Envoy 100 system was conducted in May and June of 1983 and linked BCTF computer resource teachers and Lesson Aids. Participants were able to share expertise, answer urgent questions, and pass on information to teachers in their school districts. This electronic network will continue this school year.

• Information Co-ordination

Through Lesson Aids, information exchange can take place on such subjects as classroom programs, materials, hardware and software.

BCTF computer resource teachers are available to provide consultation and in-service programs to schools and school districts. If you require information on any aspects of the Computers in Education program please contact Betty Goto (731-8121 or toll free 112-800-663-9163) or consult *The PD Book*.○

Light and colorful

BRIAN J. DOYLE

Kids love graphics. Here are ideas for assignments that will make a computer course stimulating and more enjoyable.

●As seen through an adult's eyes, especially a math teacher's, the great power of microcomputers is their ability to crunch numbers and manipulate data.

We lose a great deal as computer educators, however, if we fail to incorporate graphics and color in our students' assignments.

I realize computer games represent the ultimate evil to some computer science teachers, but when one thinks objectively and remembers that a child's play is his or her work, even designing computer games is appropriate and desirable classroom activity.

Brian J. Doyle teaches at Chase Secondary School.

My students go through the normal exercises of writing programs to evaluate greatest common factors, they generate pythagorean triplets, and do numerical sorts, but they derive most pleasure from projects, where I turn them loose and allow the creative mind to interact with the computer.

Most often these assignments involve a great deal of graphics and less teacher aid than more conventional teacher-specific assignments. This isn't to say that the students don't need structure in learning a programming language; the key is to allow them this creative interaction, to apply their knowledge and thus make it relevant.

The all too obvious point is that from a

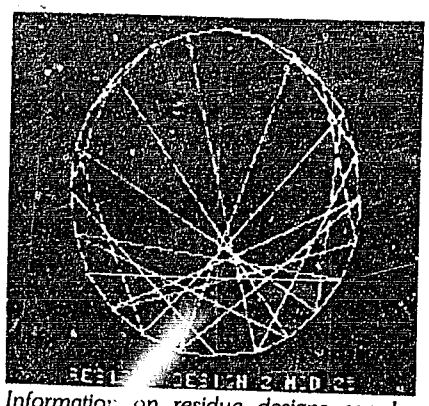
student's perspective, computers and video screens are practically synonymous, and programs are measured by what they produce on the screen. The degree of motivation that color graphics provides is fantastic, and therefore warrants an introduction to the course as early as possible.

I usually teach a section on graphics as soon as the students have mastered conditional branching and loops. They usually begin with a low resolution title page for their disk, which they run as their Hello program. I even found students doing excellent reproductions of album covers from their favorite rock groups.

After this first taste of writing programs that can control the color and shape of things on the screen, many of the students immediately begin designing simple video games, using the paddle functions and what not. At this stage I don't actively pursue this game avenue; nor do I discourage it. I simply let it evolve on its own, offering a helping hand when requested, and continue on with my regular class work.

Those of us who would like to capture the motivational aspects of graphics without the games should make assignments on computer simulations or modelling, and computer art. Obviously true computer art can be as individual as the students themselves, but to lend some structure to their programs so that they are designed with a definite goal in mind, I have my students do math-art. The Residue Designs program is a good example.

The first computer modelling program used in class was from Neal Golden's text, *Computer Programming in the Basic Language*, and involved the simulation of the spread of a contagious disease through a population. The program sets up a two



Information on residue designs can be obtained from Phil Locke's article of the same name in the March 1972 issue of ***The Mathematics Teacher.***

dimensional array representing a population of randomly placed individuals who have a certain probability of being infected because of their proximity to one individual with a given disease.

The contagious nature of disease is dramatically enhanced by the visual impact of using a low resolution plot for each individual, and color coding the progressive stages of the disease through several time periods.

Since that time I have had students working on various models as diverse as traffic modelling and the human heart, to various degrees of completion. Although they don't have the same degree of satisfaction, incomplete assignments provide for the same amount of programming skill acquisition. Keeping this in mind, it is still best to encourage students to keep their models simple by focussing on one relationship only.

For example, if a student wants to do the economy of B.C. as one student attempted, have him or her choose one market, say housing and two variables like housing starts and the prime rate, to ensure that the model remains manageable. Such models as this are conceptually simple but allow elaborate "dressing up" with the use of graphs and color charts.

I allow students to write programs as simple as the one to calculate blood alcohol levels given a body weight, number of drinks consumed and amount of elapsed time. The student writing this particular model obtained almost all of his information from a wallet sized card given as a hand-out by the RCMP as part of the Counter Attack program.

The important thing to do is to ensure that the program is indeed a simulation, however simple, where the user of the program can vary the initial limits, and the computer derives a predicted outcome. Some student always wants to produce simply an elaborate and detailed graphics display of a map of Canada, or a fighter aircraft, but usually a trip to the school library can find some data suitable for a simple modelling program.

Kids love graphics. These ideas for assignments that tend to use more graphics help make your computer science course stimulating and more enjoyable. We teachers sometimes become overly concerned with depth and substance in our course material and consequently turn off some of the students who would be better served by a lighter course. Remember that an introductory course in secondary school should be just that, and that students who continue on in computing will encounter more than enough number theory, accounting procedures, and science applications.

Keep them programming and keep their programming assignments light and colorful. ○

Logo — continued from page 22

tive knowledge about geometry. They are encouraged to "be the turtle" and to relate its movement to that of their own bodies.

This process of syntonic learning is especially valuable for younger children who need a bridge between the screen turtle and their own intuitive knowledge. Aids such as robot floor turtles and programmable toys like Big Trak offer concrete examples of graphic turtles.

Bugs are a common element of the process of learning to program. By allowing children to become programmers from an early age, the notion that bugs are correctable is supported. Thus children are not confined by a model of instruction in which they either "got it" or "got it wrong." Using the turtle as a programming object means that program bugs will be very visible and fairly easy to isolate and correct. Papert's view that the debugging concept can be carried into other disciplines is yet unproven, but makes sense if one visualizes a computer culture in which this process is valued.

Logo is indeed a superior language for teaching about computer programming and thinking skills in general. However, it is a misconception that Logo is merely a computer language for children. The language embodies powerful programming concepts, such as modularization, local and global variables, parameter passing, naming, and list processing. The potential of the Logo language is far beyond what is now being exploited.

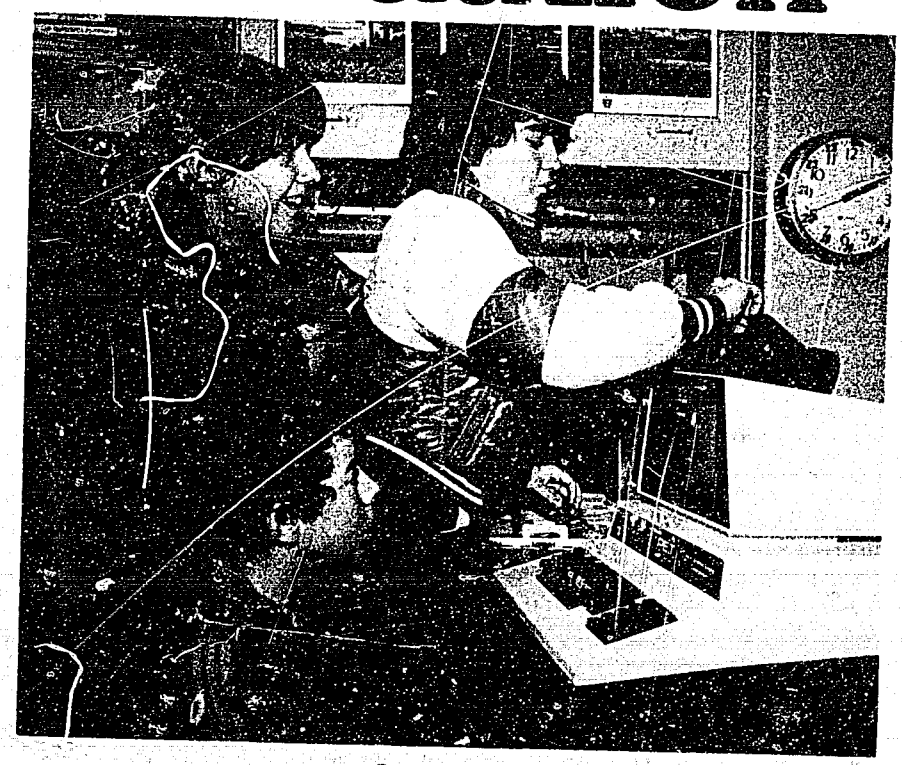
CONCERNS

What will weaken the image of Logo is the use of the language in isolation from its philosophy, especially at the elementary school level. Educators have been quick to seize the obvious asset of Logo programming, turtle graphics, and are attempting to shoe-horn it into the standard curriculum in mathematics. Maintaining the status-quo in education is not what Logo is about. Papert is not really introducing revolutionary ideas into the education system; he is simply providing a vehicle for making learning more meaningful in a computer context.

The greatest obstacle to Logo's acceptance in schools is the new relationship between teaching and learning that the philosophy encompasses. Teachers become learners. Learners become teachers. Learning and teaching become interwoven in a model of education in which the process of gaining knowledge is a shared experience.

Teachers become facilitators of the learning process rather than trainers and dispensers of information. This may or may not be a view of education that teachers are comfortable with, but it is a view that at least needs further exploration and support. ○

Software and Evaluation



— you can't have one without the other

The key to effective computer use is software. Here is a way to evaluate the bewildering array of software available.

GAYLE E. LONG

Getting started with educational microcomputing, whether at home, in a school, or in a district, involves answering three major questions:

(1) What will the students do with the microcomputers? The microcomputers can be used to teach programming, to establish literacy, or as a delivery mechanism for Computer Assisted Instruction (CAI) and problem solving. The focus may begin in one area with plans to expand to include others.

(2) Having answered the first question, one moves on to the second: what software will be needed to accomplish the goals and

Gayle E. Long is an educational consultant to the Provincial Educational Media Centre, and editor of the centre's publication, *Evaluations: Microware.*

Without appropriate, effective software the hardware may sit unused or become the domain of a few keen programmers.

objectives identified in question 1?

(3) Finally, having identified the focus of microcomputer implementation and at least a major starting point in software acquisition, the third question can be asked: what hardware will meet the needs identified in question 1, run the software identified in question 2, and is the most cost effective, while offering support services, expandability and an assurance of continued software development?

The fact that an implementation program has not been developed or provided by the Ministry of Education has meant teachers and districts have had to strike out on their own. Although the lack of guidelines is frustrating, it has placed the decisions for developing courses, establishing priorities and acquiring software in the hands of classroom teachers.

At a time when "experts" are few and far between in a technology that has no precedence in education, this has meant that the teachers are the true pioneers in the field. How then, are the pioneers getting beyond question 2?

In the past, instructional materials were sifted and analyzed and recommendations made by curriculum revision committees. Suddenly, however, classroom teachers, teacher committees and district coordinators have been faced with the task of sorting out all of the instructional, administrative, data base, etc. microcomputer materials available in all areas of the curriculum.

This is a problem, not only because of the quantity of material on the market, but also because in the past, teacher training programs have not included the evaluation process. Although teachers can examine materials and make recommendations, using a standard guide and form ensures that all important points have been examined, evaluations may be shared among teachers, and the written evaluation will have a meaning in six months' time.

The EVALUATOR'S GUIDE and form used by the Provincial Educational Media Centre (PEMC) involves a two-part process. First the evaluator "describes" the package, including the developer's rationale, instructional objectives, prerequisite skills and activities, and the content and structure of the package.

Also included in the description are references to computer responses to student answers (feedback routines), record keeping systems, and scope/sequence of the content.

After completing the description, the teacher is able to discuss how well the program meets its objectives. The checklist of characteristics, comments on strengths and weaknesses, and discussion of the potential use in the classroom combined with the "description" provide the reviewing teacher, as well as others who may request information on the program, with enough objective and subjective information that decisions on purchasing can be made locally or individually.

Because of the design of this type of evaluation instrument, a teacher need know only how to turn on the machine and load the program from a diskette or cassette.

It is very important that the final decision to purchase be based on weighing the instructional worth, the technical design and the cost effectiveness of the package. In other words, is this a sound way to teach the concepts being presented? Will the student/teacher be able to use the program easily? Would this material be better presented in a textbook, videotape, etc.? Is the cost of the program balanced by what the students/teacher will accomplish as a result of using the program?

The process of evaluation provides the information from which the teacher is able to answer these questions and make a decision to purchase or not to purchase.

A number of things are happening in the marketplace that will continue to affect the evaluation process.

(1) Some software producers are now translating programs developed for one computer so they will run on other computers. Teachers should request an evaluation of the translation before purchasing it, for some programs are radically different after translation and may not pass a new evaluation.

(2) Many publishers of software reviews publish only positive evaluations, so if a review cannot be found for a product, it is critical that the purchaser have trial periods or preview privileges that allow return of the package within a certain period of time.

(3) Software produced and evaluated in the U.S. must still be examined for regional or national bias, and metrication.

(4) The state-of-the-art CAI programs are shifting from a completely text-oriented tutorial or drill and practice worksheet approach to a format that includes graphics as an integral part of the teaching strategy.

(5) Simulations, gaming formats and problem solving activities are being developed in all subject areas and constitute a move away from traditional text/workbook lessons. Teachers will have to re-analyze their criteria for acceptable instructional design and learning strategies.

(6) Greater emphasis is being placed on management or record keeping capabilities of programs, and their usefulness will have to be weighed in the final recommendation.

SUMMARY

The evaluation process plays a very important role in implementing microcomputers, because without appropriate, effective software that will enable students to meet goals and objectives, the hardware may sit in a closet or become the domain of a few keen programmers.

Using a two-part written evaluation process, descriptive and evaluative, provides teachers with specific information that can be shared and stored for future reference.

As the state-of-the-art evolves, written evaluations that contain good descriptions will enable teachers quickly to cull outdated materials and identify the programs that meet student needs, employ appropriate learning strategies, and are cost effective.

Finally, written evaluations are having an impact on producers by providing them with educationally sound criteria for the development of software. ○

PROJECT OVERSEAS 1984

SPONSORED JOINTLY BY THE

CANADIAN TEACHERS' FEDERATION AND ITS MEMBER ORGANIZATIONS

Each year about 70 Canadian teachers are chosen to spend their summer without salary working on CTF Project Overseas. Their assistance is given upon invitation to teachers in Africa, the Caribbean, Asia and the South Pacific to improve teaching skills and strengthen professional teachers' organizations.

Administrative, travel and living expenses are borne by the Canadian Teachers' Federation, the provincial and territorial teacher organizations that are members of CTF, and the Canadian International Development Agency.

REQUIREMENTS FOR BCTF PARTICIPANTS

- membership in the BCTF
- an appropriate teachers' certificate
- a minimum of five years of teaching experience in Canada
- Canadian citizenship
- excellent health
- evidence of flexibility and mature judgment

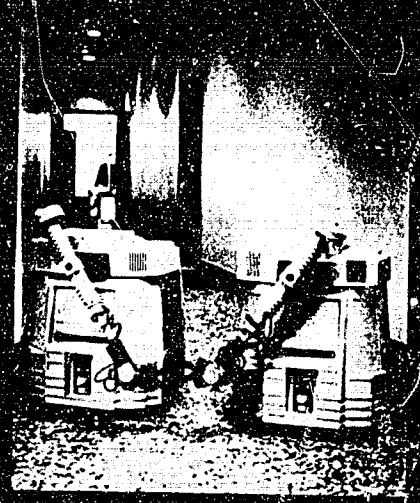
In 1982 teachers were requested to teach the following: administration, business education subjects, English, English as a second language, French as a second language, environmental education, industrial arts subjects, language arts, mathematics, reading, research methods, science, social studies, testing and evaluation, arts and crafts, music, principles and methods of teaching, guidance and counselling, home economics, psychology, pedagogy and use of audio-visual equipment.

APPLICATIONS

Deadline date for applications: **November 10, 1983.**

Application forms are available now from the BCTF office, 2235 Burrard Street, Vancouver, BC V6J 3H9. Telephone (604)731-8121 or toll free 112-800-663-9163.

How do we help students choose careers for the world of tomorrow?



Technological developments are affecting all sectors of the economy. They will eliminate some jobs and create others. How do we counsel students making career choices?

SYLVIA GOLD

Sylvia Gold is director of Professional Development Services of the Canadian Teachers' Federation.

Forecasting careers for students now in school is risky business these days. Risky, that is, if one believes that the economy and the labor market are changing and their structures will be different when our current students complete their secondary school and first post-secondary experiences.

The risk is that the forecasts and predictions we base our career advice on have as much chance of being helpful as they do of being misleading.

The facts and figures available to us for analysis and advice reflect known viewpoints and statistics, bearing on past events. We use available information and our best judgment to decide which of these measures can be projected into the future and which new and perhaps unmeasureable events are going to upset neat trend charts. Our information comes from studies, government policies, and observation.

In modern offices one person operating computer equipment can do the work formerly done by several people. The disappearance of jobs will have profound effects on the social fabric of our communities.

TECHNOLOGICAL CHANGE, WORK, AND EMPLOYMENT

When we talk about technology in relation to work in the 1980s and beyond, we are talking about such technological tools as computers, telecommunication, remote sensing, satellites and robotics. We are looking at machines that are strong, capable, tireless, and even smart. The speed with which machines can operate and communicate means that distance and national boundaries diminish in importance.

For example, a BCTF executive member can communicate with the Vancouver headquarters and some locals as easily and as quickly from Montreal as from the BCTF office. Blind people can talk to "smart" computers that can produce their words in written text and transmit them to designated recipients. Persons confined to wheelchairs can lift and move heavy loads. Musicians can produce and enjoy a clarity of sound never before imagined.

We can learn instantaneously about events around the world. We can bring a political leadership convention onto our television screens with its emotion, its wheeling and dealing, and its frenetic pace that makes us feel part of an event that rivals the greatest sport competitions in drama, partisanship and intensity. Despite the science fiction quality of some technological achievements and projections, and despite the many cases of computer and communication system "crashes" and unanticipated "down" times, the systems are working, and will grow in number, quality, use and availability. Machines do indeed become extensions of ourselves, and the implications for the nature of work are enormous.

Two major schools of thought are developing regarding the impact of new technology on the world of work. The first maintains that the new technology will replace workers. Consequently the numbers of the unemployed will rise and remain high and severe social and political disruption will result.

The second view says that the new technology will liberate people from long hours of work. It will increase productivity, and therefore fewer person-hours will be required to produce the goods and services needed to maintain our desired standard of living. It further states that we shall find ways of sharing the wealth that is generated by this productivity and shall live in a new "Renaissance," which will see the flowering of Canadian society.

Some may dub those who hold the first view as purveyors of doom and gloom, who hold too limited a view of our resourcefulness and deny the power of economic theory to intervene and change the current state of affairs. They suggest that unemployment figures do not represent workers displaced by robotics or computers, but represent the lazy, the unresourceful, and the unskilled, who have only to use some entrepreneurial drive to create their own work, to retrain, to relocate for jobs, or to be willing to take "any job" in the spirit that all legitimate work is honorable.

Their spokespersons say that the price we must pay for our profligate ways — overspending leading to intolerable levels of inflation — is belt-tightening and retrenchment until inflation is down and the economy can improve. The relentless impact of technology into our economic life is seldom acknowledged by the critics of the doom-and-gloom picture.

Commentators reflecting on the second, more optimistic, viewpoint may find it naive. Our political and business leaders are telling us of the imperative to increase our productivity in order to compete internationally and retain a reasonable share of world markets. The critics say that rather than anticipate that increased productivity will enable us to reduce our hours of work, and to share the income it generates, we shall have to proceed relentlessly in improving our productivity to compete with our rivals in a bitterly competitive world. It is worth noting that the focus of this discussion of productivity puts aside other factors that contribute to successful international trade, such as the knowledge of the language, culture and history of our trading partners.

Productivity and the ability to compete at home and internationally are emerging as the key emphases of the new workplace.

THE MEANING OF WORK

The recent Monty Python film, "The Meaning of Life," opens with a ten-minute trailer that grippingly albeit humourously illustrates the clash between the industrial and the information business models.

As the film begins, elderly gentlemen are working their shift in the accounting department processing numbers on their adding machines, under the watchful eyes not only of their supervisors but of time-and-motion recorders. Realizing the full implication of this management manoeuvre, the clerks take destiny into their own hands, transform their office building into a mighty pirate ship, and move off to attack the new enemy, the corporate skyscrapers churning out data faster than any fleet of humans. The trailer ends with a conclusive victory by the determined pirates, in true Monty Python style.

As romantic as the galleons of human calculators are, the steel and marble emblems of knowledge and information processing are the inevitable and inexorable victors. Old technology puts up a valiant fight against the new; audience sympathy is

with the displaced but the futility of the adventure is obvious.

But work is not only a place we go to on a regularly scheduled basis to perform certain tasks. Work has given us our identity, describes our contribution to society, determines our social status and income, and influences how we spend our time, our years, and our retirement.

So it has been in recent memory. This is changing. Whether we are "doom and gloomers" or "naive optimists" we see evidence of displacement in the labor market, and the unleashing of a chain of consequences. The loss of one's job means the loss of one's identity, as a teacher, a telephone clerk, a forestry worker or a television set designer. The days of the unemployed are no longer organized around hours and responsibility of work. As unemployed persons we have diminished incomes and limited opportunities for meaningful or pleasurable activities. We are open to depression, anger, and crises of confidence in ourselves and in our society.

The only positive solution to these new problems is to side with those who say that as productivity increases with technological change, and as fewer person-hours are required to get the job done, the necessary working time should be distributed equitably among all working people, as should the wealth thus generated, in salaries and in redistribution through the tax structure. In this context, the 35- or 32-hour work week is a sensible short-term objective.

Productivity and the ability to compete are the key emphases of the new workplace.

An important element of our work in giving career advice in current times is to understand the need to develop a different concept of the relative position of "work" in defining a person's worth. This new concept, while not denying the contribution of work to human existence, places the other components of our lives in higher profile. After all, we are friends, parents, children, craftspersons, amateur sports enthusiasts, music buffs, and community volunteers. As work becomes less consuming of time, energy and, in some cases, pleasure, the other parts of our lives that make us human can be developed and enjoyed.

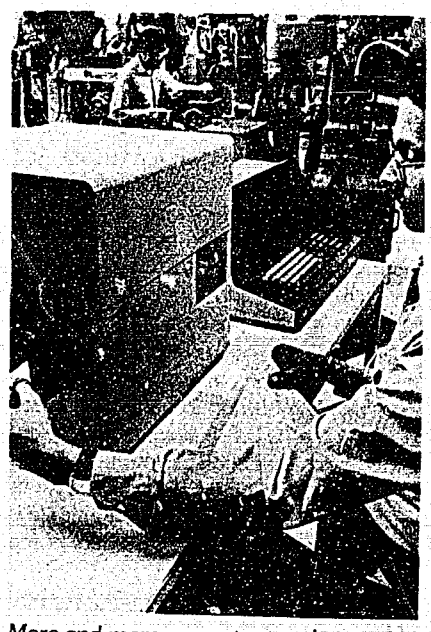
The implications for counselling young people as they prepare for life and for work, as well as the implications for school programs, are enormous. When who we are is no longer determined in so large a measure by the work we do but by our social role, the expression of our interests and abilities, our interaction with other people in family and friendship, or our concern for our community, country and planet, we shall seek a different kind of preparation for life in our educational institutions.

Lest I be misunderstood, I add one clarification. I do not see a world run by machines where human beings will spend their days in play and personal endeavors alone. The need for human work will always be essential, particularly if we continue to value a broad base of contributers to political, social, cultural and economic activities, and the need for personal economic independence. However, the new technologies will result in a change in the balance in our lives among its major components: work, family, community and personal activities.

TECHNOLOGY AND THE LABOR MARKET

In developing a strategy for forecasting career opportunities for today's secondary school students we should consider the structure of the labor market and the kinds of career opportunities it will offer them.

The economy is thought of as being divided into three major sections: the primary, secondary and tertiary sectors. Primary sector jobs are essentially in mining, agriculture, and forestry; that is, in the extractions industries. Secondary sector jobs are in manufacturing. Tertiary jobs are in the service sector, and include everything from hotel, restaurant and tourist services to finance, banking, information processing, knowledge gathering and many professions. Herman Kahn, a widely consulted futurist, adds a quaternary sector, where activities centre on crafts and the arts.



More and more computers are being used in industry to increase productivity. One consequence is the addition of thousands of workers to the unemployment rolls.

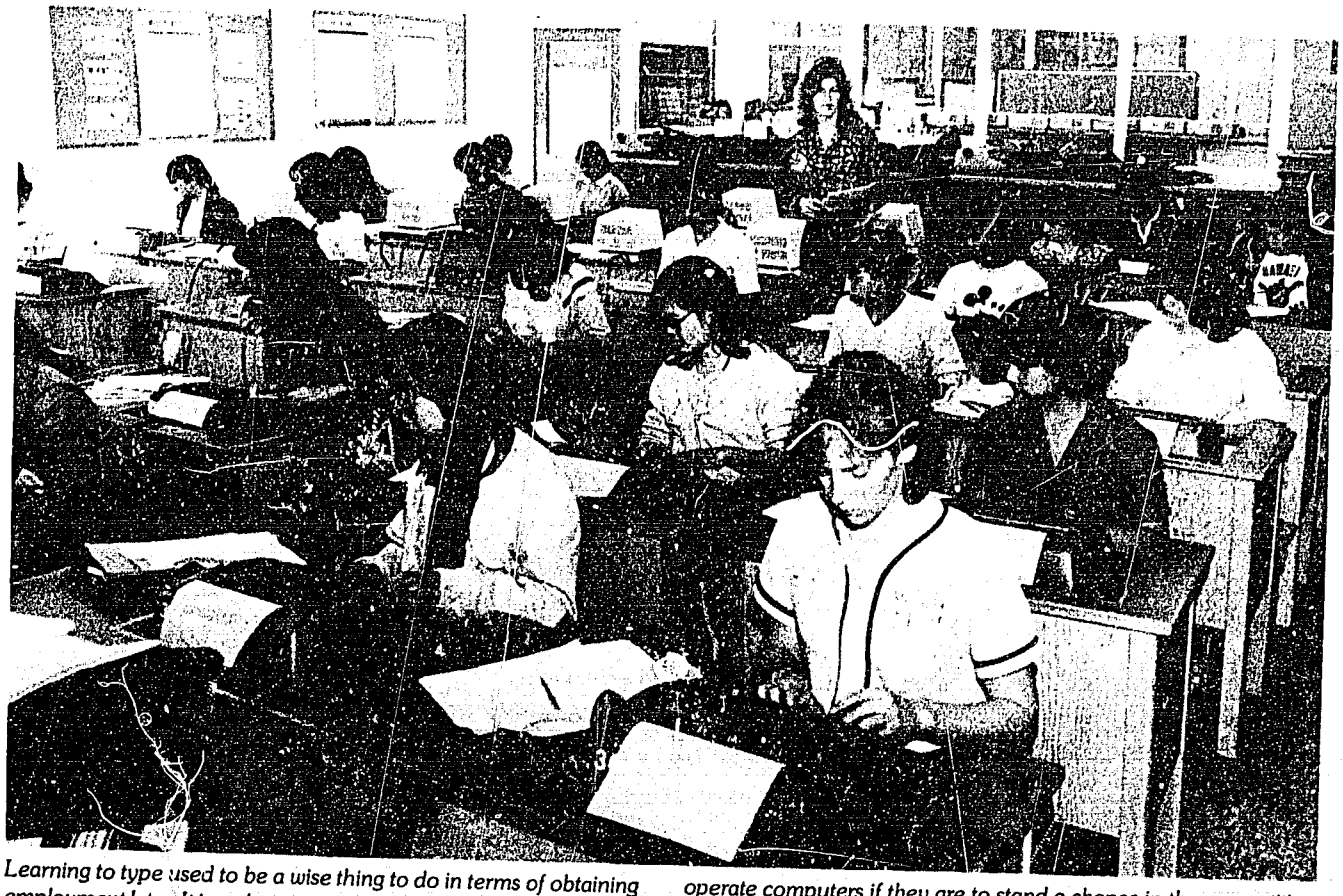
The schools will have to offer a different kind of preparation for life.

It is no surprise to British Columbians that the primary sector jobs are in trouble and the closing of extraction industries is contributing to a major economic slump. Secondary sector auto workers have seen the writing on the wall as technology replaced people in the car manufacturing process. Even in the tertiary sector, communications workers such as typesetters and television technical crews have seen their numbers decimated as technology takes over.

However, the tertiary sector is a growing sector. It is here that information and knowledge are gathered, analyzed, processed and communicated, and that the most startling changes are taking place.

The growth we see in the tertiary or service sector is not in an increase in the number of jobs in existing categories, though one could argue cogently that more such positions should be filled in such areas as health care, social services, geriatrics, and lifelong education. The growth is in new, heretofore unknown employment categories.

At this point those of us so inclined can embark on flights of fancy to list the new kinds of jobs that may emerge from this surge of growth in information and technological development. The June 1982 edition of *The Futurist* offers a few to start us off: energy technician, housing rehabilitation technician, hazardous waste management technician, industrial laser process technician [according to *The Futurist*, "laser manufacturing equipment and processes (including robotic factories) will replace many of the machine and foundry tools"], bionic-electronic technician, and new ma-



Learning to type used to be a wise thing to do in terms of obtaining employment later. It is no longer enough; students must also learn to operate computers if they are to stand a chance in the competition for jobs when they leave school.

terials utilization technician. (Cetron and O'Toole, 1982) Also suggested are: geriatric social worker and paramedic.

Since at least 1981 the federal government has been indicating the importance of technology to Canada's economic development. At a national conference on microelectronics and the work environment the then Minister of Labor, the Honorable Gerald Regan, said:

"What has increased our concern about microelectronic technology is the rapid pervasiveness with which it will be applied. Not a sector of the economy will be unaffected. Few jobs will go untouched. Traditional occupational profiles and wage structures will be tested."

More recently, in May of this year, the federal government published a paper titled "A Technology Policy for Canada," which announced the formation by the prime minister of a cabinet sub-committee to advance technology in all economic sectors, thus assigning a high political profile to the position of technology. The cabinet ministers who will serve on this committee hold portfolios in economic development, communications, labor and international trade.

The paper announced a financial commitment of $58.5 million over the next two years to the National Research Council's Industrial Research Assistance Program for technical assistance; a budget boost of $27 million to the National Science and Engineering Research Council to encourage post-graduate studies in the sciences; government plans to encourage research networking among government, university and industry labs; $9 million to fund specific joint industry and university technology development programs; and $7.5 million to expand the microelectronics design program, which may link as many as 30 universities. (Steklasa, 1983) According to the Canadian Council of Engineers, "Total federal science expenditures for both the natural and human sciences are expected to reach $3.24 billion in 1983-84 compared to the $2.93 billion spent in 1982-83."

Professor S. Muthuchidambaram of the University of Regina reports: "The new job openings are in all areas of computer design and applications. The hardware area needs skilled people with an electrical engineering background to design chips and their applications. The software area requires men and women who understand control production and mechanical systems. The shortage ranges from data processing to logic, systems and software skills of all types."

He continues, "The introduction of machine intelligence into the manufacturing and service sectors will lead to a division of workers into highly-skilled and low-skilled categories, wiping out the intermediate skill range which is vital for both the reality and possibility of upward mobility. This trend will not be restricted to unionized workers, but will affect middle management as well." (Muthuchidambaram, 1982, pp. 9-10)

Suzanne Roth, consultant in business education and economics for the Protestant School Board of Greater Montreal, states, ". . . office occupations appear to be in an evolutionary transition. . . . As new technology is introduced into the office, jobs are becoming more specialized and more sophisticated. . . . The findings indicate a need for students to become familiar and comfortable with computers and other new office technical equipment." (Roth, 1983, pp. 2-3)

These references all seem to point in one direction: the most likely areas for young people to find employment are in scientific and technological areas, and in careers that depend on the workers' ability to use and manipulate computer and communication technology. Can these forecasts be correct? If so, what place is there for the artists, the young who want to work with and help other people, the humanists, and those who are prepared to physically manufacture the goods we use? What kind of

This girl's choice to study word processing is a sound one, because word processing jobs are becoming more numerous.

balance shall we have in our society between scientific and the humanistic drives?

CONCLUDING THOUGHTS

In a radio interview on CBC "Sunday Morning", June 12, 1983, Dr. Stuart Smith, chairperson of The Science Council of Canada, reminded listeners of the perils of relying too heavily on forecasting. He suggested that Canada should develop contingency plans that would allow us to adjust to and take advantage of events. We cannot, according to Smith, abandon whole sectors of our economy whose plants have become antiquated and uncompetitive, such as steel, automobiles, and textiles. Indeed, technology may breathe new life into these industries and enable us to hold on to some jobs in these areas. He is most worried about people with limited skills and those who prefer physical work — these are the jobs most replaceable by technology.

Smith's advice appears to be that rather than be carried away by our fear of new technology, we must as a society discuss the possible options open to us, anticipate the benefits we may derive from technology, and proceed with re-training and other measures to smooth the transition to a more technological society. His final statement noted the increased need for people in the social services, an area where machines can never substitute for human interest, warmth and understanding, and the very area that is currently under-funded.

Smith's comments bring to mind one of John Naisbitt's main themes in his book, *Magatrends*. Naisbitt links "high tech" with "high touch," suggesting that as we bring more machine technology into our lives, our need for human contact, art, music, and warmth and softness in our lives will become an increasing necessity. Articles on the lives of people who work in the new technologies bear this out.

Dalton Camp warns of the need to maintain a strong program in the liberal arts and the humanities at the university level. He says: "The only antidote there is to the sublime arrogance of modern science would be the deliberate training of men and women raised in the humanities. . . . In all this great explosion of discovery and information there is truly a necessity, a need for the journalist, the teacher, the corporate public affairs officer, the enlightened politician, and the enlightened bureaucrat." (Camp, 1983, p. C2)

As a final comment, may I offer some thoughts on preparing our students for career opportunities in a technological world.

"The computer is temporarily out of order, but we have been asked to try to think without it."

- Our students are entitled to a general education that will permit them to:

(a) understand how society works and changes, and to be part of that social evolution should they so desire;

(b) experience a number of disciplines and learning processes, to get to know their own talents, interests, and potential;

(c) prepare for a lifetime of learning in a very dynamic world;

(d) build a foundation of knowledge and skills that will help them plan as time goes on, incorporating work, family, community and personal fulfillment into their lives.

- We must resist all efforts to diminish the teaching and learning of languages, the arts, the humanities, and of physical education, to maintain a "high touch" response to "high tech" influences.
- Our students must study the sciences, and be able to consider a future in scientific work and scientific policy making, as scientists and as lay persons.
- Our students should have opportunities to study the role of our institutions — government, labor unions, business — in representing our interests.
- Students should have opportunities to study labor market structures, and to learn about the events and decisions that lead to changes in these structures. This study may help them understand what choices are available to them and, most importantly, how they can be prepared to change careers and enter into new options as the labor market changes. It is estimated that this new generation of Canadian workers will change jobs at least three times in their working lives.
- All students should have some school-based experiences with computers as communication and educational tools. The arcades and home computer games will not give them a sense of the utility of the technology, or of its place as a tool for human use rather than a toy for entertainment.
- As for forecasting careers, we must recognize that there are pitfalls on basing the future on the past. Students interested in scientific and technological careers should be encouraged to pursue them. Students whose interests are in the humanities and the performing arts should be given every opportunity to study these disciplines. All students should experience both major streams.

Together, as a society, we must strive to maintain a balance in education and in career opportunities, so that our economy will engage the artist and the telecommunication technician, the teacher and the computer engineer, the blue-, the white-, and the steel-collar workers. ○

Bibliography available on request.

Are Computers Leading Us to Complete Centralization?

When does computer *assisted* instruction become computer *dominated* instruction? Will the new technology produce an education system with all the authority at the top?

DON BURBIDGE

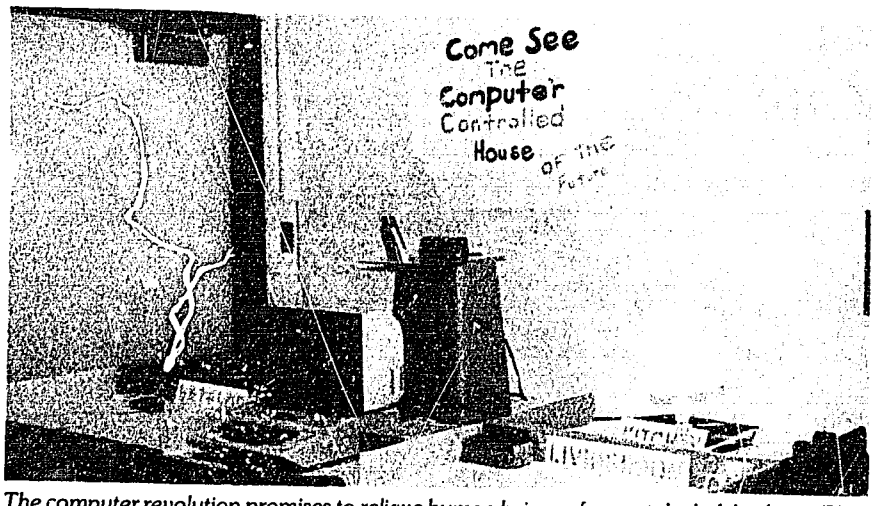
●Whenever someone solemnly intones the catchphrase, "You can't stop progress," I reflect upon the possibility that I am a Luddite.

I realize that the term is commonly used to designate an imbecilic tendency to resist progress, by violent means if necessary.

Such a use had some basis in that the original Ned Ludd apparently *was* an imbecile, who made a name for himself at the outset of the industrial revolution by going berserk and smashing a couple of the machines that made stockings faster than he could by hand.

But those who adopted the name of Luddites were anything but stupid. They formed themselves into secret and well-organized societies and went about at night systematically destroying harvesting, spinning and weaving machines, and confounding the authorities. They were not so much opposed to technology as they were to technological unemployment, which enriched a few, but impoverished multitudes.

Don Burbidge teaches at the Langara campus of Vancouver Community College. He has served as a school trustee in North Vancouver.



The computer revolution promises to relieve human beings of a great deal of drudgery. This Campbell River Junior Secondary School display demonstrated some of the things computers can do around the house.

They were, mistakenly we now say, attempting to preserve a healthy and vibrant pre-industrial way of life against massive change carried out with no thought of what was being destroyed, but only of profit.

I am not about to organize a clandestine group to go about smashing computers in the dead of night, but I do claim that we ought to give a little thought to the nature of the progress these marvels may bring, and that as humans we are not limited to either leaping joyously aboard the juggernaut or being crushed beneath it.

I suspect that during the rise of the Nazi party in Germany, a good many people mouthed the slogan, "You can't stop progress." Well, it was stopped, perhaps because it wasn't progress.

These Luddite sympathies of mine were most recently inspired by an assortment of speakers at conventions I have attended, where we took a close look at the technological innovations that, we were told, are going to change the whole nature of education and hence society.

These meetings featured a series of starry-eyed computer experts who advised that advances in microcomputers, video discs, and satellite communications have made contemporary education obsolete. Visions were held up of a future in which the whole of North American education could be efficiently and inexpensively provided by letting students teach themselves at school, or better at home, by means of a personal console that would "meld," as they were fond of saying, a typewriter, television set and microcomputer, attached to a macrocomputer by telephone cable or satellite, permitting them to learn with all the rapidity that children currently show in mastering Pacman.

Education would be individualized, to use a morsel of the jargon, since each child would be able to proceed at his or her own pace, enjoying a one to one relationship with the master teacher whose wisdom is programmed into the computer.

Testing done by computer would allow it to record, analyze and correct any weakness, build on strengths and determine vocational aptitudes much more efficiently than the school system does today.

Furthermore, it would be relatively painless learning, since, we are told, children generally hate conventional school in direct proportion to the amount of time they spend there, while they love television and most especially video games, which are a fun way of learning.

One enthusiast mentioned that Pacman had already earned three billion dollars, while the movie Star Wars had made only about half a million. Such figures, he felt, would appeal to both educator and entrepreneur. Contemporary schools, in contrast, don't make money; they use it in vast quantities.

Whenever these experts were making their pitch to a slightly paranoiac set of teachers, they took pains to assure them that the computer would never replace teachers, since the aim was "computer assisted instruction" or CAI. Teachers, they said, would be able to use the technology to enhance their teaching, although they would certainly find their role was changed and they would certainly have to learn to program the computers with relevant local detail.

There was a faint threat implied here, rather like the construction boss telling the ditchdigger that he had better learn how to run a backhoe, or he would be out of a job. But generally the experts were soothingly and I thought falsely reassuring.

Falsely, it appears, because other experts assured us that, once fully established, instruction by computer would cost about a third as much as conventional education, a figure that must delight taxpayers and politicians currently struggling with restraint. But then came the crunch. A more candid expert observed that, initially at least, CAI would be very expensive, and he couldn't conceive of the authorities choosing to increase current education costs by one third, by *adding* CAI to an already costly system.

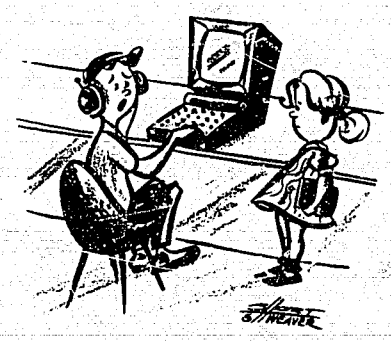
Rather, he said, teaching assistants, then teachers, then junior professors would have to be gradually phased out as computer instruction was phased in. He further indicated that computer instruction lends itself to economies of scale, and that the preparation of "software" would be most efficiently handled by huge corporations producing programmed courses for huge markets.

Thus the most efficient education system would serve all of North America, covering everything from kindergarten to graduate school, and would originate from a great macrocomputer, located, perhaps, in the city of Chicago, and financed by a conglomerate of CBS, IBM, General Motors, General Foods and assorted generals in the pentagon.

Given the imperatives of cost and profit, such centralization seems very attractive. It is now occurring in the textbook publishing industry. If you can replace 50 widely dispersed publishing houses by a couple that are centrally located, your greatly enhanced profits will permit you to mass produce books that include an ersatz form of local color so prominent in the texts used in school today by your children and mine.

Similarly, if you can replace 5,000 economics professors currently teaching in North America with a single cherubic Milton Friedman, beamed into every home at prime educational time, you will not only cut costs tremendously, but will also assist students in avoiding any errors that currently arise through the incompetence or subversion of local instructors.

One could learn psychology from B. F. Skinner, and political science from Henry Kissinger, instead of from local third-raters. And children could take Grade 3 math and



"It doesn't know that to err is to be human."

social studies by means of a program prepared by experts and delivered by master teachers. Why settle for less? You can't stop progress.

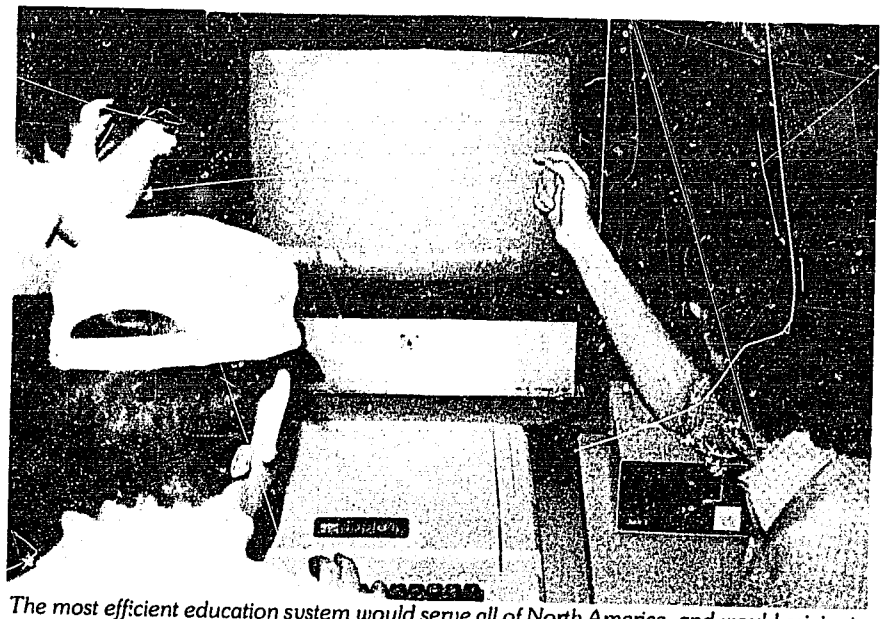
We are on the threshold of such electronic marvels. The publisher of *TV Guide* is reputed to have just given the U.S. Public Broadcasting System (desperate for funds as a result of Reaganomics) a couple of hundred million dollars to develop 500 college courses for broadcast. Students, we are told, could enrol in a conventional college course, but take it and be examined in it by TV and computer console, and get the credit from the college without having to leave home. That Canadian marvel, Telidon, is bruited for a similar role.

Distance learning is the pet of Patrick McGeer, B.C.'s minister of Higher Education, and his Open Learning Institute and Knowledge Network are front runners in the race to make Vancouver, rather than Chicago, a centre of the lucrative software industry.

Their advocates make ritual bows in the direction of local control and the continuing need for teachers, but cost imperatives clearly point to centralized control and distribution.

All along this joyride to the future, my Luddite tendencies stir. Yet I must admit that the displacement of the ditchdigger by the backhoe was progressive, whatever the views of unemployed ditchdiggers. I acknowledge that technology in agriculture has allowed us to produce more food more cheaply, even though the percentage of the population engaged in agriculture has dropped from about 80 percent in 1880 to 8 percent in 1980.

But whenever I bite into one of those tasteless chickens reared in agribusiness chicken factories, I wonder if progress hasn't been overdone a bit. I agree that technology has been beneficial to us all in relieving the vast majority of the population of grinding physical labor. Similarly, the computer revolution promises to relieve humans of grinding mental labor, and none is more grinding than that of teaching a class of students who do not want to learn.



The most efficient education system would serve all of North America, and would originate from a great macrocomputer financed by a conglomerate of CBS, IBM, General Motors, General Foods and assorted general in the pentagon.

Indeed, I am even prepared to consider technological unemployment as a boon, rather than a curse, if it means that humans may be permitted to live free, creative lives, emancipated from stupefying, brain-numbing labor.

But where does progress stop and degeneration begin? When does Computer Assisted Instructed become Computer Dominated Instruction? I do not speak simply from the point of view of a teacher afraid of losing my job. My age is such that the process will culminate long after I am retired or dead. My concerns are, I think, less personal and more political and educational. Let me explain.

Consider the possibility of centralized control made feasible by computer instruction. At the moment, the rhetoric of the computer experts holds that the computer can only assist; can never replace the teacher. Advocates of our own Open Learning Institute claim that it will serve only those who cannot attend regular institutions, because they live in Atlin, or because their work requires that they travel, or because they are confined to an institution.

Yet increasingly, courses are being added, for example in criminology or nursing, that are aimed at relieving five or six Lower Mainland colleges and institutions of providing separate courses. This is certainly economical. Why hire five or six instructors when one on TV will do? Instructors can be available part-time by telephone so that each student may enjoy some direct human contact. Not quite as good as the student-teacher relationship traditional at colleges and universities, but convenient for students who want to study at home, and certainly economical in an era of increasing demands for education and decreasing public funding.

Besides, you can't stop progress.

My point exactly. Where does the process stop, short of the great Chicago Computer Education Service? It is important to note that economy is only one reason why corporate executives, bureaucrats, and politicians are attracted by centralization. The other lies in the possibilities of control, certainly the strongest motivation factor for such people.

Central control is the essence of autocratic systems, just as local control is the essential feature of democratic systems. Centralized control relieves the autocrats, be they single dictators, a panel of bureaucrats or a junta of corporate executives, of the nagging fear that somewhere, somehow, in some classroom, some subversive ideas are being introduced into the tender

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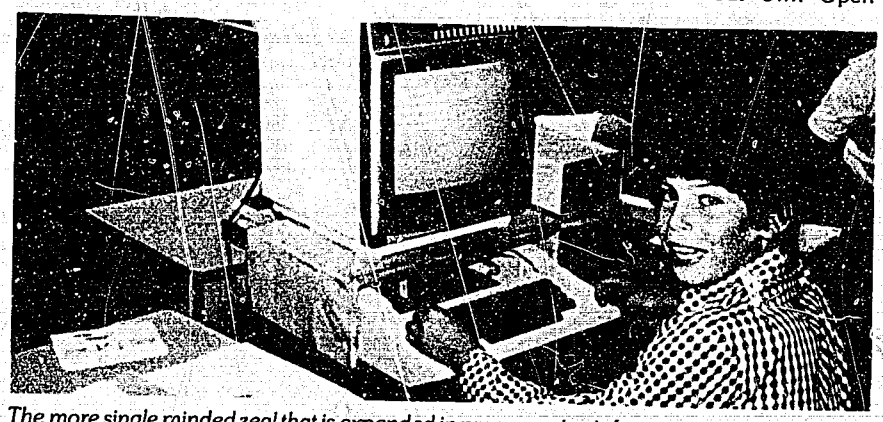

The more single minded zeal that is expended in programming information into children, the lower the prospects of getting any creative endeavor out.

Teaching, Technology and Literacy

The relationships among teaching, technology and literacy are complex and controversial. Many questions have yet to be answered.

CHARLES UNGERLEIDER

During the past five years teachers have been assaulted with a barrage of material devoted to the "new" technologies, especially television and microcomputers.

Critics of the new technologies decry them because they believe that reliance on them will destroy literacy and the intellectual standards on which literacy is based. Proponents see them as the panaceas for the educational problems facing us.

The relationships among teaching, technology and literacy are complex and controversial. There are many questions that should be raised, but have yet to be addressed. Here are what I regard as some of the more important questions and some tentative answers. I hope that my comments will spark further discussion.

QUESTIONS TO CONSIDER

Is technological literacy different from other forms of literacy? What do people need to know to be considered technologically literate? What would be the consequences of failing to educate people about the new technologies? What should be taken as evidence that people have become more technologically literate? How should education about technology relate to other forms of education?

If technological literacy is something that should be cultivated, how much and what kind of knowledge do people require about the new technologies? What concepts, principles and generalizations should guide the development of technological literacy? What skills does one need to be a full and active participant in a community in which the new technologies are used? What attitudes should people possess toward the new technologies?

Who bears the responsibility for promoting technological literacy? What prior knowledge and experience must a person have to teach successfully about technology? What point of view toward technology should be expressed or implied by those attempting to educate about technology? What ethical considerations apply between those who are teaching about technology and those who are learning?

Is there readiness for acquiring the knowledge, skills and attitudes associated with technological literacy in the same way that we speak about "reading readiness" or readiness for formal reasoning? What developmental characteristics of the learner should be taken into account in designing instruction that promotes technological literacy? What social and cultural factors should be taken into account in designing instruction for promoting technological literacy?

SOME SPECULATIVE ANSWERS

Two events made literacy possible — the invention of moveable type and the creation of free public education. Nevertheless, after more than five centuries since the development of the former and more than a century since the creation of the latter, there are still more than 800 million adult illiterates in the world. Although this figure seems astoundingly large, the number is almost certain to grow despite the efforts being made to eradicate illiteracy. Indeed, the recent innovations in computer and telecommunication technologies are likely to reverse the trend toward universal literacy.

Before the advent of advanced communication technologies, literacy was regarded as the ability to read and write. The invention and proliferation of satellite, computer and television technologies created the need for a new definition of literacy. Today, literacy is appropriately regarded as the possession of skills, knowledge and attitudes that enable people to take a full and active part in the affairs of their community. This includes the ability to use computer and telecommunications systems.

In some parts of the world, computer and telecommunications technologies are being introduced before many of the inhabitants have become print literate. The developed countries possess a monopoly on the new technologies. The North's hegemony extends from the elaborate research and development enterprises that have spawned the new technologies, to control over the production of hardware and software. Nevertheless, even within the developed countries the gap between those who possess the skills for using the new technologies and those who do not is as wide as the gap between those who are print literate and those who are not.

The development of technological literacy is occurring along economic lines in northern countries. In the United States, the distribution of microcomputers in schools tends to favor the more affluent. Thus schools in more advantaged communities are more likely to have access to the new technologies than schools in less advantaged areas.

This disparity is also mirrored in people's access to the information storage, analysis and retrieval systems that use telecommunication and computer technologies. At present, access to these services depends on the ability to pay. Under such circumstances, the achievement of universal literacy does not seem likely.

Federal and provincial governments

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have the responsibility for ensuring that data bases are available without charge to public libraries, schools, colleges and universities. Governments are also the repositories of enormous quantities of information. Census data, statutes, parliamentary reports and the like should be made available to the public through these institutions.

Only provincial governments have the resources and management systems to ensure the equitable distribution of computer technologies to public schools. Most provinces are in a position to fill the need for such technology as a form of economic and technological development. British Columbia possesses the technological resources to design, produce and distribute its own microcomputer system to the schools of the province.

Schooling has traditionally involved learning how to control one's symbolic universe by reading, writing and speaking. In a world dominated by print, this training was sufficient. But, as society places greater emphasis on technologically sophisticated information transmission, storage and analysis systems, schools must see technological literacy as part of their mandate.

The responsibilities teachers have require that they develop a reasoned perspective about the new technologies and the school's relation to them. This perspective should include a clear understanding of different forms of literacy, the contributions and limitations of the new technologies, and an understanding of the implications of the relation between literacy, technology and their role.

There should be three directions toward which teachers guide the school's activities. One direction involves knowledge about the new technologies — especially microcomputers. The purpose of instruction would be to educate students to manipulate the technologies to their own ends with facility.

Unless there are substantial changes in school curricula, there will probably be a sharp demarcation between students with access to the new technologies and those without access. Confronted with identical assignments, students who do not possess the skills for using the new technologies will be confined to data sources and forms of data manipulation that will put them at a disadvantage when compared to their technologically literate counterparts.

A second direction involves knowledge of the relation between technologies and the societies in which they are used. The purpose of instruction would be to develop students' understanding of how technologies transform, and are transformed by, the societies in which they are employed. This should involve more attention to understanding how and why societies change and the consequences of the changes for the societies.

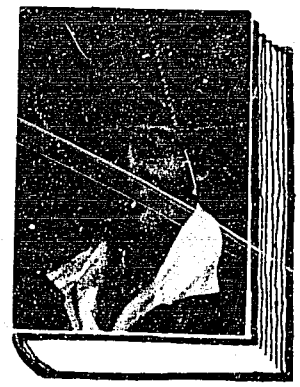
A third direction is to give increasing attention to the ethical considerations that apply in the relations among people that result from the use of the new technologies. Questions about how knowledge may be used and to what ends should find a more prominent place in the schools' curricula. Issues about privacy, ownership of ideas and access to information, for example, should become topics for investigation.

Teachers bear the responsibility for programs that promote technological literacy. Their position in the school puts them at the focal point for promoting technological literacy. The new technologies will require them to become proficient in the use of those technologies, knowledgable about their relation to the societies in which they are used and sensitive to the ethical considerations the technologies create.

I have not addressed all of the questions raised in this article. Many of them require research that has yet to begin. All of the questions depend for answers on imaginative and thoughtful discussion among a varied group of people, including technologists and philosophers as well as students and teachers.○

New Books...

GRACE E. FUNK



Opinions expressed in these reviews are those of the reviewers, and not necessarily those of the B.C. Teachers' Federation, the editor or the new books editor. Reviews are edited for clarity and length.

Addresses are given for publishers not listed in Books in Print, Canadian Publishers' Directory, *or* Books from British Columbia.

ACROSS THE DESK — HOW TO PET YOUR APPLE

●"By the turn of the century, most Americans will never have known a world without silicon chips."

Don't boggle; read some of the helpful new books choking the publishers' warehouses. Read, for example, *Computers in curriculum and instruction*, a 1983 publication of the Association for Supervision and Curriculum Development (225 North Washington St., Alexandria, Va. 22314, $9.00) from which the quotation comes. It is a 173-page compilation of 23 papers covering many aspects of computers in education. It is arranged logically from planning for and choosing computers and software through a rundown on Minnesota Educational Computing Consortium and computer literacy for teachers and students. Seven of the papers are about computer uses in specific subject areas, including the Guido system of music education. The final paper, "Into the future," is a humorous scenario of The Little Red Computer in 2011.

The book has many practical excellencies; software evaluation is on two levels — a check list of seven items of demographics, and performance evaluation under the headings of directions, instructional organization, including branching, consistency, help, handling of errors in pushing keys, and reaction to wrong student responses. One paper is a bibliography of "Resources for instructional computing." The emphasis throughout is on the need to rethink the concept of teaching, and to control the technology rather than be controlled by its experts.

Read the *Canadian Journal of Educational Communication*, Vol. 12, No. 3 Spring 1983. (AMTEC, Box 1021 Stn B, Willowdale, Ont. M2K 2T6), and decide whether artificial intelligence does or does not exist, or may ever exist, or can teach students to think about their thinking. Set against it "The Computer as Fool: a Reconnaisance of Post-technology and its Participants" in the same issue. CJEC is a thoughtful change from the hoopla of the computer slicks and the nuts and bolts of the "let's get on with it now" publications.

Read *Agenda* Vol. 5, No. 1, Science Council of Canada (listed Nov./Dec. 1982) and consider your new role as a "curriculum designer" instead of an "information transmitter." (But will the bureaucracy really permit total decentralization to serve a student's individual needs?)

Read some of *Computers in the schools: a guide for planning* (listed Nov./Dec. 1982). Zero in on the chapter that seems most useful: "Organization and control of computers," perhaps; or "Computers and the elementary teacher" — and be comforted to know that peer-tutoring works very well to build computer competence in the classroom. Or go back to "Why should schools use computers?" and consider the case of the two-year old with the hammer — "suddenly a lot of things need hammering."

For a more practical approach read *The elements of CAL: the how-to-book on computer aided learning* by David Godfrey and Sharon Sterling (Press Porcepic, distributed by Beaverbooks $14.95). Intended for someone who has mastered at least one computer language, and is engaged in designing courseware, the book nevertheless contains some pertinent comments on goals, objectives, and CAL as one method of meeting them. More examples would have been helpful. Detailed and thoughtful, it is far from being a "cookbook." The last four chapters consist of two courses, Fractions and Words, carefully described to implement all the nine "layers," that is, rules and theory of the previous chapters.

Consider reading *The world of computers and information processing* (listed Nov./Dec. 1982). It is a textbook designed to provide a broad spectrum of knowledge, concepts, and skills. The chapters are independent modules, to be taken in any order over a two-year course. It is well organized as a text, with stated chapter objectives, summaries, review questions on two levels, projects, glossary, etc. It has four main themes: problem solving, programming, hardware, and applications in society. Although not stated, the book appears to be senior secondary or college level. It is illustrated with photographs of computers in use, and is readable and attractive.

Similar in theme, but upper elementary or junior secondary level is *Spotlight on computer literacy* by Ellen Rickman (Random, 1983 $9.00). It has three main themes: how computers work, how computers affect life, and programming. Organized like a workbook, illustrated with cartoons, it gives a variety of review and discussion questions, and some intriguing programming exercises.

For a Canadian version of the same sort of thing, try *The age of computer literacy* by Larry Noonan (Oxford, $11.00). The brochure mentions basic programming for Apple, PET and TRS80, and a detailed teacher's manual.

More specific still is *Word processing: keyboarding applications and exercises* from John Wiley and Sons. (Listed Nov./Dec. 1982) It is the Canadian version of an American text teaching basic keyboard skills on a memory typewriter, text editing skills, and sophisticated information processing skills covering a wide range of office practices. It is illustrated with photographs of a great variety of office machines, themselves an education in modern office practice. Jobs and assignments may be simulated if all the equipment is not available.

Remember a constantly recurring theme of "problem solving," sometimes called logical thinking or step-by-step approach, then read Neil Postman's *The disappearance of childhood* (Delacorte, 1982) and listen to him telling us that "it is not inevitable that the computer will be used to promote sequential, logical, and complex thought among the mass of people. There are, for example, economic and political interests that would be better served by

allowing the bulk of a semiliterate population to entertain itself with the magic of visual computer games, to use and be used by computers without understanding. In this way the computer would remain mysterious and under the control of a bureaucratic elite. There would be no need to educate the young."

Read aloud with a child *Print-outs, the adventures of a rebel computer* by Claudia Cornwall (Nerve Press, Vancouver $5.95) Edgar, the rebel (main-frame) computer, tells his own story. He is tired of working problems, and tries to joke with his programmer. He avoids debuggers, goes on strike, meets another computer called Ethelred, writes poetry and finally contacts his original programmer and a story writer called Claudia. The format resembles a computer print-out, including the holes at the edge, the upper case letters, and the computer graphics. When you have finished, go ahead and invent some more adventures for Edgar, or his little brother, the microcomputer.

Finally, re-read *Mindstorms: children, computers and powerful ideas* by Seymour Papert (reviewed Nov./Dec. 1981) and decide to let your children teach you the possibilities of computers for learning. (When convinced, read the *Apple Logo primer* by Bitter and Watson (Prentice Hall, 1983 $16.95) and get started.)○

BOOKS RECEIVED

Anisef, Paul. *Losers and winners: the pursuit of equality and social justice in higher education* by Paul Anisef, Norman Okihiro & Carl James. Toronto, Butterworth, 1982. 225 pp. paper $9.95 0-409-81111-4. Evaluation and recommendations, with an equality-of-results orientation, regarding access to higher education in Canada, by professors of sociology.

Barndt, Deborah. *Getting there: producing photo-stories with immigrant women* by Deborah Barndt, Ferne Cristall & Dian Marino. Toronto, Between the Lines, 1983. 110 pp. paper $8.95 0-919946-29-1; hard $16.95 0-919946-28-3. Order from Between the Lines, 427 Bloor St. West, Toronto, Ont. M5S 1X7. Ostensibly a how-to about photo-essays, this workbook has much to say about group processes, racial and sexual bias in advertising, and job hunting.

Beck, M. Susan. *Kidspeak: how your child develops language skills.* Scarborough, New American Library, 1982. 120 pp. paper $7.50 0-452-25376-4. Popular work by a linguist offers parents and teachers a guide to the meaning of language development ages 6 to 12. Examples of metaphor, narration, invented words. Helpful suggestions including a booklist.

Brownhill, Karen D. *Reading is not for me* by Ian Fraser and Karen Brownhill. Toronto, Clarke Irwin, 1983. 208 pp. paper $9.95 0-7720-1383-7 (Aspects of Language Across the Curriculum Series) Teacher's guide available. Conversational and inviting approach to improving the reading skills of scanning, skimming, speeded reading, recreational reading, study reading. A variety of interesting practice passages for secondary school students.

Courtenay, Richard. *Re-Play: studies of human drama in education.* Toronto, OISE Press, 1982. 224 pp. paper $24.50 0-7744-0248-2. Eight essays on learning as drama, by a professor of drama, concluding with a theory of curriculum from a dramatic perspective.

Day care and the Canadian school system. Toronto, Canadian Education Association, 1983. 64 pp. paper $4.00 0-919078-82-6. Order from Canadian Education Association, 252 Bloor St. West Suite 8-200, Toronto, Ont. M5S 1V5. A survey of child care services in schools — programs, fees, school board and provincial policies.

French immersion and school boards: issues and effects. Toronto, Canadian Education Association, 1983. 44 pp. paper $4.00 0-919078-85-0. To order see above. National survey of effects on public relations, staffing, administration, budget, enrolment, program quality. Cautiously optimistic.

Journey: Australasia's geographical magazine. Dee Why, N.S.W. 2099 Australia, Rigby House. Subscription A $19.00. Order from Koala Books of Canada Ltd., 14327-95A Avenue, Edmonton, Alta. T5N 0B6. Vol. 4, No. 3, Sept.-Nov. 1982 has 136 pages of slick color; 12 articles on opium, Brisbane, Kangaroo Island, Pagan and other places in Australia and New Zealand. Educational supplement included. An interesting possibility for school libraries.

Major, Judith Strand. *Arts and the curriculum for the 80s.* Toronto, Ontario Ministry of Education, 1983. 35 pp. paper $3.00 0-7743-8062-4. Order from OISE or Publications Centre, 880 Bay St. 5th Floor, Toronto, Ont. M7A 1N8. The arts are perceived as a frill in classrooms, but society needs creative thinkers with original solutions; therefore the arts are essential — for achieving perception, concentration, uniqueness of thought style, inventiveness and self-worth.

Miller, John P. *Teachers in transition: study of an aging teaching force.* Toronto, OISE Press, 1982. 66 pp. typescript. $6.95 0-7744-5057-6. Results of a study of teachers based on Levinson's five stages of adulthood. Chiefly exerpts from interviews.

Roberts, Douglas. *Scientific literacy: towards balance in setting goals for school science programs.* Ottawa, Science Council of Canada, 1983. 43 pp. paper free 0-662-12533-9. Order from Science Council of Canada, 100 Metcalfe St. Ottawa, Ont. K1P 5M1. A discussion paper concerned with the "why" of studying science.

Sharing: a challenge for all Proceedings of the Eleventh Annual Conference, International Association of School Librarianship, Red Deer, Alberta, August 1982. Compiled and edited by John G. Wright. 420 pp. paper. Enquire from International Association of School Librarianship, School of Librarianship, Western Michigan University, Kalamazoo, Mi., 49001. Vivid, interesting discussions of the chidlren's literature and school library services of ten countries, plus twelve presentations from English and French Canada. Useful booklists and workable suggestions.

Sopiro, John. *Notes on teaching manual skills to adults in night school classes.* Privately printed $15.00. Order from John Sopiro, 587 Carnation Place, Victoria, B.C. V8Z 6G6. Readable and commonsense guidelines for planning, questioning, safety, demonstrations, teaching aids and evaluation, written for adult education instructors with skills but no formal teacher training, by a former instructor of "Techniques of Instruction" at Camosun College.

Stanworth, Michelle. *Gender and schooling; a study of sexual divisions in the classroom.* London, Hutchinson, 1983. 64 pp. paper $4.40 0-09-151161-5. Order from Copp Clark Pitman. Interviews with secondary school students and teachers in England discloses a subtle, deep-seated and almost unconscious bias operating to the disadvantage of girls.

Teacher's program planner. Toronto, Copp Clark, 1983. 368 pp. spiral $7.96 0-7730-4052-8. Daybook with spaces for long range planning by term and by month, plus everything you might wish to record, and some you might not. Of interest are the detailed individual student records and interview records.

LANGUAGE

Barrow, Robin, *Language and thought: re-thinking language across the curriculum.* London, Ont., Faculty of Education, The University of Western Ontario, 1982, 40 pp. paper, $2.95. 0-920354-16-5. Order from publisher at 1137 Western Road, London, Ont. N6G 1G7.

Mountaineers, when asked why they climb mountains, are reputed to reply, "Because they are there." I sometimes suspect that school people, if asked why they are concerned about such things as public criticism of the school system or the curricular demands of special interest groups, might also respond, "Because they are there." We are indundated by suggestions and advice on what to do and how to do it, and sometimes our only answer to the question *why* is similar to that of the teacher who when asked why her class was doing page 17 of their workbooks replied, "They won't be able to do page 18 until they have finished page 17." This is not meant as a criticism of classroom teachers — these busy, dedicated people don't often have time to ask themselves *why* — but as a plea for some sort of valid criterion by which conflicting demands can be assessed.

Robin Barrow in this little book discusses just such a criterion for determining the role of language throughout the curriculum. He examines a number of theoretical positions, plays down the "vast amount of empirical research into teaching methods and strategies," and finds his criterion in the close relationship between language and thought. If that doesn't sound too profound to you, please read the book, because Barrow elaborates his proposition very cogently.

One thing I like about Barrow's analysis is his emphasis on relating instruction, both through and about language, to the reality of the pupils' experience of the world: "Learning a language is, initially, learning about the world." Without that emphasis it seems to me the pupils are in danger of drowning in a sea of essentially meaningless words.

I also like Barrow's position on *standard English.* Many critics who deplore the present state of the language and demand a return to the higher standards of a bygone day seem to me to appeal more to snobbery and nostalgia than to reality; their feelings about language are possibly akin to those of Mark Twain about the school system: "It ain't what it used to be, and what's more it never was." Why should we lay so much emphasis on *standard English?* Barrow

speaks at one point of "concern for precision in the rational mode of discourse"; at another he refers to "love of language and concern for accuracy, specificity and coherence"; at yet another he uses the term "public language." These points suggest to me better reasons than we usually hear for the school to stress the importance of *standard English*.

I commend Barrow's book to all teachers, not because he has the final answers, but because he points out a direction for us to go if we ever do find time to consider the important question *why*.
— Don Levey, Armstrong

A NOTE ABOUT BOOK PRICES

●Prices quoted in these reviews are publishers' list prices, and are subject to varying discounts: 5 to 15 per cent on textbooks and 25 to 35 per cent on trade books. Library editions and pre-bound books do not have discounts. Where price is not mentioned, this fact is noted in the review.

Prices listed by American publishers are American list prices. Prices asked by Canadian agents are likely to be considerably higher, with or without a discount.

A Canadian agent does not necessarily carry all the lines of the American publisher he or she represents. Be prepared for a few disappointments.

Teachers buying books for their personal use should try to secure at least a 10 per cent discount from book stores, or ask for the regular educational discount when ordering directly from the publisher or his or her Canadian agent. Be sure to establish that you are a teacher when you send in your order. Where possible, use school stationery.○

PUBLIC EDUCATION

Cochrane, Jean. *The One-room School in Canada.* Don Mills, Fitzhenry and Whiteside, 1981. 166 pp. paper, $12.95. 0-88920-380-8. Hard, $19.95. 0-88902-379-4.

This delightful book, which covers rural one-roomed schools across Canada would be a valuable, interesting, and readable addition to any school library. The photographs of early rural schools, of pupils, of teachers, of parent groups and school boards are fascinating. The stories of school concerts, meetings, dances and picnics reveal the rural school as a genuine centre of community life.

The text, which contains well-chosen excerpts from inspectors' reports, news reports and school board minutes, is excellent. The descriptions of conditions in the schools — which are given in brief excerpts from original sources — of pupil health, of sanitary conditions, of texts and curricula, of the duties and responsibilities of teachers, provide first rate glimpses of school life in our not so distant past.

Since I spent the first eight years of my school life in a one-roomed rural school, Fairgrove, near Sedgewick, Alberta, the report aroused many nostalgic memories.
— Frank Snowsell, Kelowna

Dick, Judith. *Not in our Schools?!!!* Ottawa, Canadian Library Association, 1982. 97 pp. paper, $15.00. 0-88802-162-3.

"See no evil — speak no evil — hear no evil": the three students on the cover of Judith Dick's compendious approach to a history of schoolbook censorship in Canada testify mutely to our need for wisdom in the provision of library resources and reading lists. The punctuation of the title — the interrogation mark overborne by three exclamation points — suggests that the topic of book selection is no open question.

As Dick remarks, "The taking up of extreme positions has the potential of exciting emotions and damaging community relations far beyond the damage alleged to be caused by a school book." The documents she assembles, mainly newspaper and journal articles, are sufficiently inflammatory to justify a restrained presentation. The book's subtitle, *A Discussion Guide*, hints at the bitter divisions that have racked school systems across English Canada over the last 20 years as seen by "a Manitoba resident."

The body of the book — 60 pages — is firmly sandwiched between pages bearing the same apposite quotation from the Bible — in case any hypersensitive reader should fail to recognize the author of the exhortation to let our minds dwell on whatever is true, honorable, right, pure, lovely, of good repute, excellent, and praiseworthy. The five chapters include sufficient quotations to substantiate each controversy. Each of these "figures" is followed by a feature called "Something to Think About" — questions directed at issues suggested by the documents, which is followed by a page or two offering further perspectives. A section called "Opinion" closes each chapter.

That so short a book contains a bibliography of 163 items says much for the author's scope and earnestness. Four appendices reproduce official directives for eliminating sexism, ensuring academic freedom, evaluating textbooks, and selecting learning resources: a fifth appendix reports on an attempt to survey such policy-statements on a Canada-wide basis.

As might be expected, certain books — *The Diviners, Flowers for Algernon, Go Ask Alice,* and the venerable *Catcher in the Rye* — seem to be cited frequently, as though the question "What was all the fuss about?" might be answered fairly simply. What precisely was objected to is often more difficult to ascertain. Chapter II succeeds in establishing as "offensive aspects" the useful categories of the (sexually) immoral, the profane, the seditious, the heretical, the violent, the sexist, the labor-related, and the nationally sensitive.

In the absence of citations of Milton and Mill, who speaks for the books? An author may not, after all, make the ablest apologia for her own fiction: Margaret Laurence, for example, described her novel *The Diviners* as a "profoundly religious book," but immediately revealed that by religion she meant "coming to terms with the past, with your ancestors" — a subtle and heterodox justification.

The non-teacher is free to shrug and remark, "Of tastes there is no disputing." The head of an English department may perceive that "Every single book we teach could offend somebody," but is not free to act so philosophically. Unfortunately, "the basis on which books are chosen is not at all clear" in the typically decentralized school system. Fortunately, there are plenty of stalking-horses: "The lines of responsibility once a book is challenged are not clear."

Who stands to gain as the sounds of battle die away, adrenalin levels return to normal, and apoplexy is, happily, avoided? Probably no one, but sometimes the publisher, perhaps the very captain of industry whose agent supplied the book that offended and that now needs to be replaced. Just as there are few apostates such as the Winnipeg principal who tore the nudes from an art book to appease a parent, so there are few martyrs like the Moosoomin teacher "over a decade ago" who was dismissed over classroom use of *The Georgia Straight* and reinstated elsewhere. Sterner justice may be on the way as American publishers displace Canadian houses, and American group militancy moves in.
— Anthony Allingham, Vancouver

Seeley, David S., *Education Through Partnership: Mediating Structures and Education*, Cambridge, Mass.,

Ballinger, 1981, 307 pp., Cloth, $30.20 U.S. 0-88410-825-2.

"Threeness", dominates this analysis of threatened American public education. Part one identifies the problem, part two suggests a solution, and part three outlines applications.

The problem is threefold — governmental control is all pervasive, the education system, in fact a delivery system, is completely bureaucratized, and teachers have become pathologically professionalized. The solution proposed is an educational partnership of parents, teachers and students as the decision-makers. The education partnership is dependent on three elements — voice provided to community, parents, students and teachers, choice given to the constituents in the partnership and loyalty that will stem from the provision of voice and choice. Community and parents in effect become a mediating structure between big impersonal government and the isolated, alienated citizen.

In the application section, Seeley proposes three alternatives — community control, or family control, or learning partnerships of parents, students and teachers. In promoting learning partnerships, Seeley advocates action with school-level councils, mini schools and programs, and above all, a co-operative classroom with much one-to-one tutoring. Seeley reminds the reader that "small is beautiful," although "large can be beautiful too."

Footnotes are extensive, but are inconveniently bunched at the back of the volume. Although the author has read widely, his bibliography is not listed. A detailed table of contents and a comprehensive index partially compensate.

Seeley's conservativism provoked personal concerns. Only three will be mentioned. Teacher power, I believe, contrary to Seeley, has been a positive, a boom, not a negative, not a bust, to teachers. Seeley argues that minimum competence testing does not have the effect of reducing education to those elements tested. I subscribe to Eisner's tenet that "what is counted, counts." Seeley offers family control, or the voucher system, as one alternative, and this is, I believe, anathema to his proposal for restoring a sense of community through dialogue and learning partnerships. Seeley states that "it is . . . one of the highest purposes of our public education system to develop a sense of community in a diverse population."

I am both happy and sad that I read this volume after I had prepared my report, *In Search of Public Education for the 1980s: Think Globally, Act Locally.* I am happy because although I was in Canada looking at the B.C. situation, infinitesimal in size, complexity and problems to the gargantuan U.S. systems, my analysis and proposed remedies are remarkably similar to those of Seeley. I am sad because I agree with the final comment, ". . . a public school system that continues on its present path — will not much longer endure." In his epilogue, he adds that "we must begin in earnest the political dialogue about which way to turn."

Since my report was released in January 1983, we have had a provincial election, and no change. The dialogue to build the learning partnerships, I believe, has not been seriously and earnestly engaged. Meanwhile, are not the sands of time and public support for public education still being relentlessly eroded?

— John Church, Vancouver

Classified

READING

Meek, Margaret. *Learning to Read.* London, The Bodley Head, 1982. 255 pp. hard, $13.95. Order through Clarke Irwin.

Learning to Read from the title to the end focusses on the learner. In an exquisitely realistic fashion, Margaret Meek has her audience thinking in terms of the children who are doing the learning. Although this book is addressed to parents with whom the author carries on extremely interesting discussions, it is really for anyone who has a genuine interest in children and who is or would be the "supporting adult" in the task of learning to read at any age or stage.

Basically, Meek's technique for helping, supporting, advising or encouraging someone who is learning to read is the same on all levels. The experiential differences are in the individuals — the learners themselves. Meek makes two key statements that are really the heart and soul of learning to read. The first: "Before a child goes to school he doesn't really know he can fail." A little further on she underlines this with, "Real help begins by strengthening confidence rather than emphasizing failure." The second: "A book, a person, and shared enjoyment: these are the conditions of success." She follows this with "Begin to help by looking for books you can read together. The time for doing this is all too short."

The author makes it starkly clear that adult anxiety is swiftly and invisibly passed on to the learner if he or she is not "catching on fast enough." She repeatedly assures all who want to know that the enjoyment of reading is a strong force for learning to read. When sharing these joys starts early in a child's life and continues all through the growing years, "Reading is learned by reading".

Margaret Meek is both a teacher and a parent herself. She sees learning to read and children through 20 years of experience, doubly underlining her credibility as an adviser to teachers, parents and those who aspire to become such.

Her book deals with children learning to read from "Before Five" through "Seven Is Important" to "Round About Eleven" and "at Fourteen or so."

Whether she is discussing the toddler being introduced to books or the "Lost Adolescent," the author believes that "what the beginning reader reads makes the difference to his view of reading." Let's face it. This applies also to the adult illiterate who presents him or herself for a "Learn To Read Adult Class."

The concerns of the beginning reader at each level or stage are discussed. Helpful suggestions for supporting and encouraging the learner are given for parents and other interested adults. Accounts of difficulties for learners at these different stages add interest. Also, samples of parents' questions about children's reading are presented. The practical point of view of the author and her decisive good sense are evident in her answers.

Nowhere does Margaret Meek pull her punches when she charges with their responsibilities parents, teachers, reading specialists, researchers and other learner-supporting people. Nowhere does she lay blame. Her beautifully balanced point of view is a feature of this book.

Another outstanding feature is this author's book lists. Every recommendation has been carefully selected. A number of them have been presented in the body of the text. Some are to help take care of special learner needs at a given stage. Others are to help parents understand what is happening in the reading development and the thinking of their child.

If you really want to think about learning to read as the other side of the teaching reading coin, read this book.

— Vera MacKay, Oakville, Ontario

UNIVERSE

Jastrow, Robert, *The Enchanted Loom: Mind in the Universe*, New York, Simon and Shuster, 1981, 185 pp., $15.70. ISBNO-671-43308-3.

"If we 'do' the Louvre in the morning, then we can 'do' Paris in four days," I enthusiastically, eagerly and expectantly exclaimed to my life companion, my wife, on the eve of our first visit to Paris. Four days later, the Louvre, indeed, all 'done,' Paris was a gigantic blur in our memories.

That 14-year-old comment resurfaced as I perused Jastrow's *The Enchanted Loom: Mind in the Universe*, only 168 pages of text, with many of these turned over to illustrations. Admittedly, *The Enchanted Loom* is the third volume in a trilogy that follows *Red Giants and White Dwarfs* and *Until the Sun Dies*. However, *the Enchanted Loom* is designed to stand on its own, if not to bamboozle and overwhelm the innocent reader. Jastrow takes that unsuspecting reader from his theory of the origin of the universe, to the beginnings of life, to the evolution of higher forms of life — that is, through the stages of the growth and increasing complexity of the brain. From here, the reader is led to the development and refinement of the computer, and on to speculation concerning a "thinking" computer's replacing or at least working in conjunction with humankind.

An annotated recommended reading list, excellent charts and diagrams, an adequate index partially compensate for the mind blowing felt by the innocent reader.

If you want the history of the universe, including the evolution of all life, and the refinement of computers in 168 pages, I recommend *The Enchanted Loom*.

— John Church, Vancouver

Centralization?

Continued from page 35

minds of the young. The Chicago complex would be much the best way of relieving that fear. Patrick McGeer and William Van der Zalm would sleep much better at night knowing that education was being handled in the safest, most efficient, least expensive way possible.

You may find it inconceivable that a virtual cottage industry such as education, with a school in each community and a host of teachers dealing directly with students, could be replaced by such a highly centralized system dealing with multitudes. I suggest it was equally inconceivable to the cottage weaver at the outset of the Industrial Revolution that he and his fellows could be replaced by huge factories run by multi-national corporations.

A common response to this apocalyptic view of education is that while you can mass produce shoes and socks you cannot mass produce well educated citizens. You can, however, mass produce well programmed, well disciplined robots.

And here I encounter another concern regarding computer assisted — let alone computer dominated — instruction. Wherever its enthusiasts gather, and whatever they talk about, be it distance learning, teaching machines, learning packages or programmed courses, they tend to speak solely of the process of putting information into students in the most efficient way possible, presumably with the aim of having them spew it out on demand by examiners or employers.

Yet, surely by now there is general agreement that an educational experience should do a great deal more than merely inform students; that it should also inspire them; that an important but secondary function of education is that of pouring information and skill training into students, while the primary function is that of getting some creative thinking and acting out.

My impression is that if educational theory and practice have made any progress at all in the last 50 years, it lies in the recognition of the need to develop much better ways of assisting students to develop their creative abilities. We haven't, I sense, made much progress in satisfying the need, other than stumbling over the fact that the more single minded zeal is expended in programming information into a child, the lower the prospects of getting any creative endeavor out.

Hence I made a point of asking the computer experts whether any thought had ever been given to the use of the machines in enhancing creative thought and action. Could any of their computer programs be used to inspire as well as inform? Or should we simply set aside the problem of creativity with a sigh of relief, and immerse ourselves in the techniques of programming students? Their responses betrayed a certain puzzlement with my questions, and gave me the impression they didn't have any conception of the nature of creativity.

Indeed, the very fact that I voiced such questions simply served to confirm my Luddite status with the technologically devout. Yet I am far from the view that we should smash all computers. I support wholeheartedly their use in freeing teachers from the tasks of programming students with basic skill and knowledge, so that they can devote maximum time to the development of creativity and social competence, now so sadly neglected. I have no difficulty with television as a learning medium for the geographically isolated or the bedridden, who are unable to gather together with other people to learn. But I also argue that we should avoid what one speaker called the "gee whiz" mentality that accepts any new technique without question of consequences.

We humans have the ability to control change so that it really does constitute progress for us all in the long run, rather than profit and power for the few in the short run. Indeed, that is one of the lessons we are supposed to have learned from studying the horrors of the Industrial Revolution.

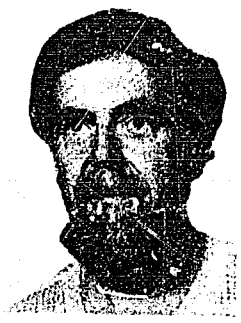
With my Luddites' banner aloft, I suggest we confront the technological zealots. No doubt they sincerely believe themselves to be at the spearpoint of progress, shearing through superstition, obscurantism and sloth, impatiently shrugging off the questions of negative doubting people like me.

I see *them* as gadarene swine.

I suspect we are both in error to some degree.○

Snap Shots...

GEOFF HARGREAVES



THANKS FOR THE MEMORY

It's not frequently I regard my students as heroic figures from the grand epics of the past, but occasionally during a formal exam, when here and there I spot a student accosting his or her memory for an elusive fact, I'm reminded of the Trojan hero Aeneas vainly attempting to cling to the ghost of his wife who was unfortunately incinerated during the collapse of Troy.

"About her neck three times I flung my arms," Aeneas laments, "and three times her image fled them."

On their less elevated plane students undergo the frustrating anguish of Aeneas. They lunge at the required memory but it evades them. They try again but it's no go. Their eyes and face go dismally blank. The lips then twist wryly, making last urgent attempts to suck a mixture of comfort and inspiration from the butt ends of masticated pens; but the memory's long gone. The students stare up at the clock, pathetically bereaved.

To lessen this epic distress, I've tried giving my students the aid of mnemonics, an ingenious weapons-system designed to combat oblivion, especially when preparing them for such scholarship examinations as Literature 12.

But the trouble with the mechanical mnemonics recommended by modern wizards of total recall is that they are so artificial and cumbersome you are more likely to clog up the mind with barbaric enigmas than manufacture an easy key to useful information. For example, from my own schooldays, I can still recall that the answer to any possible question on the dedication to Shakespeare's sonnets is contained in the mnemonic 3 X J V A P, but what the mnemonic itself now means resolutely defies all my efforts at elucidation.

"How am I *meant* to remember all this stuff about Hamlet's character?" a student asked me in disgusted tones last year.

After explaining briefly — and I suspect, unhelpfully — that I was only his teacher and not in the business of assigning meaning to anyone's existence, I suggested, "Well, use the name *Hamlet* itself as a guide: *H* for 'hesitating,' *A* for 'articulate,' *M* for 'mother's boy who may or may not be mad,' *L* for 'latently incestuous,' and so on. . . ."

This neat device, however, proved to be of only limited use, for it turned out that when it came to selecting names for his characters, Shakespeare wasn't primarily concerned with their mnemonic applicability. In fact, we discovered early on that from the point of view of mnemonics, it would have been far better if Romeo had been named Juliet, since his behaviour was *initially* Juvenile, his reputation, at least with the older Capulets, Untarnished, and his passions at first Labile but then Intense and Extreme, and finally Tragic.

It was at this point we stumbled on Francis Yates's erudite book *The Art of Memory*, which describes the techniques of recall used widely from antiquity through the Renaissance up to Leibniz. The secret of a good memory, she claims, lies in assigning to images "exceptional beauty or singular ugliness," for pathological details, "strikingly hideous and horrible," help engrave on the mind the ideas and principles we wish to recall. Indeed, no less a luminary than Thomas Aquinas says you can't get by without them, as "simple and spiritual intentions slip easily from the soul, unless they are linked to corporeal similitudes."

And I figured there might be something in this, because I've never forgotten my Grade 12 teacher telling us that in order to demonstrate his contempt for conventional morality, the cynic Diogenes was the first and possibly the only philosopher on record who masturbated in the street.

So, in our chaster and no doubt less memorable way, that's what we're doing this year with Tennyson, for one. Come next June, our students will wish to recall that, among other things, this important figure:

1. suffered from the family melancholy, the so-called "black blood" of the Tennysons, but rose above it to become a baron;

2. was fascinated by the idea of suicide, which he justified sometimes as religious martyrdom; other times, as military sacrifice;

3. was Poet Laureate;

4. believed in Evolution, which he likened to a train rushing down the tracks, but also in its converse, Reversion.

To fix these four points in the memory, we've constructed the image of a giant with black blood dripping off his head from under a baron's coronet. His left hand is directing a dagger against his own heart, above which is a crucifix and below a Victoria Cross. In his right hand he carries a bunch of laurels. About his feet runs a railroad shaped like a figure 8, the engine hurtling now toward us, now away.

Of course, there's no guarantee the method will work as it's intended to. So here's a warning. It may be that if you're marking the Lit. 12 paper next summer, you'll be startled to learn that Tennyson was an overgrown kid with a thing about trainsets, who once got covered in glory while doing an oil-change on his Coronet and who, though he really preferred gardening, spent much time unpicking decorations from his lapels with an unsuitable implement.

But at least we can say we have tried. If you have further complaints, why not address them to Thomas Aquinas?○

Geoff Hargreaves, our regular columnist, teaches at Cowichan Senior Secondary School.

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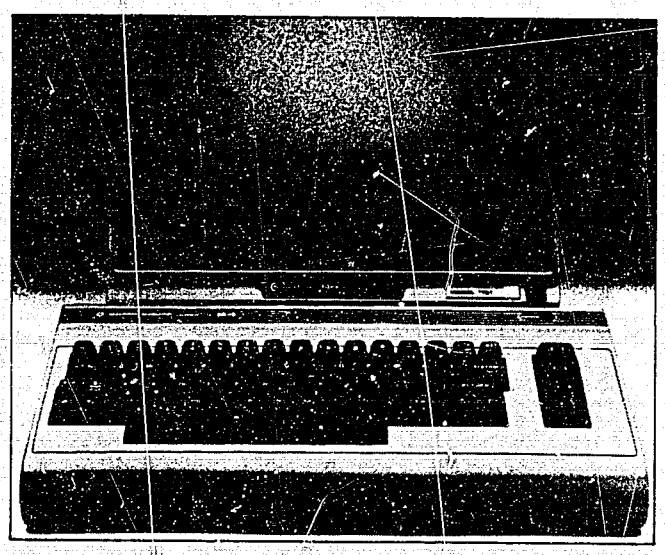

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