NOTES FOR THE GUIDANCE OF AUTHORS

The Editor is always pleased to receive for consideration articles on aspects of educational technology, media use and research likely to be of interest to readers. Topics of interest include: computer assisted instruction, learning resources centres, communication, evaluation, instructional design, simulation, gaming, and other aspects of the use of technology in the learning process. Two primary forms of contributions are welcomed: refereed articles, and notes and non-refereed articles. It is important that contributions conform to the notes below.

Notes and Non-Refereed Articles

1. Contributions for this category are welcomed from all members. Writers are encouraged to use a familiar, casual style. Jargon should be avoided.
2. Contributors to this section surrender to the editor the responsibility of final copy edit. Articles will not be returned for author approval prior to publication.
3. Contributions to this section do not require additional notes or references. If these are included they must adhere to the style guidelines for refereed articles.
4. Include your name, position, institution and mailing address.
5. Type contributions on 8 1/2 x 11 paper using a 60 stroke line, and double-spaced. Do not break words at the end of a line.
6. Non-refereed articles should be from one to five pages in length. Notes of upcoming events or other news should be one paragraph in length.

Refereed Papers

1. Manuscripts should be 5-20 double spaced, typed pages.
2. Include an abstract of about 100 to 150 words.
3. The author's name, position, institution, and mailing address should be on a separate page.
4. Authors should send three copies.
5. Contributions are accepted on condition that the material is original and the copyright vests in the Association for Media and Technology in Education in Canada. Contributors must obtain all necessary permissions and pay any fees for the use of materials already subject to copyright.
6. Type contributions on 8 1/2 x 11 paper, using a 60-stroke line. Do not break words at the end of a line.
7. **Main headings** should be centered and typed in upper case. **Secondary headings** should be typed at the left-hand margin, using upper and lower case underlined.
8. All tables, diagrams, figures, or photographs should be submitted in camera ready format. Diagrams, tables, and figures should be provided on separate sheets of paper. The position of each item in the text should be indicated as follows:

   Table 1 about here.

9. References in the text should employ the author/date format (eg: Kowal, 1982). All references should be listed at the end of the paper in alphabetical order. The American Psychological Association Style Manual (2nd edition) should be referred to by all authors to ensure consistent reference style.
10. Spelling should conform to the Merriam-Webster **Third New International Dictionary.**

MEMBERSHIP

AMTEC MEMBERSHIP APPLICATION

ASSOCIATION for MEDIA and TECHNOLOGY in EDUCATION in CANADA
L'ASSOCIATION des MEDIA et de la TECHNOLOGIE en EDUCATION au CANADA

NAME _____

TITLE _____

ADDRESS _____

_____

_____ Postal Code

TELEPHONE – Bus. ___ (Area) ___-____ EXT. ____

Res. ___ (Area) ___-____

PLEASE COMPLETE THIS FORM AND MAIL WITH YOUR PAYMENT TO:

Guy Leger
Asst. Superintendent of Curricu
Metropolitan Separate School B
80 Sheppard Ave. E.
Toronto, Ontario M2N 6E8

TYPE OF MEMBERSHIP
(please check one)

- ☐ Student ..... $ 20.00
- ☐ Individual .... $ 40.00
- ☐ Institutional ... $ 60.00
- ☐ Commercial .. $110.00

CANADIAN JOURNAL OF EDUCATIONAL COMMUNICATION

- ☐ is available to non-members on a subscription basis — four issues per year . . . $40.00

SPECIAL INTEREST GROUPS

- ☐ Media Utilization
- ☐ Instructional Developers
- ☐ Media Teachers
- ☐ Media Managers
- ☐ Microcomputers in Education
- ☐ Other: _____

WORK ENVIRONMENT

- ☐ Elementary
- ☐ Secondary
- ☐ College
- ☐ University
- ☐ Business
- ☐ Government

Canadian Journal of Educational Communication
Vol. 13 No. 3
June, 1984
ISSN 0710-4340

CJEC Vol. 13 No. 3
June, 1984

CONTENTS

SPECIAL SUPPLEMENT

COURSES IN

MICROCOMPUTERS IN EDUCATION IN CANADIAN UNIVERSITIES

The **Canadian Journal of Educational Communication** is published quarterly by the Association for Media and Technology in Education in Canada, P.O. Box 1021, Station B, Willowdale, Ontario, M2K 2T6.

All correspondence to the editor should be addressed to
Dr. Denis Hlynka, Editor CJEC
Faculty of Education
University of Manitoba
Winnipeg, R3T 2N2

COMING NEXT ISSUE (VOL. 13 #4)

Lois Baron
CHILDREN'S MEDIA WORKSHOP: A TELEVISION LITERACY WORKSHOP FOR CHILDREN.

Arthur Shears
EDUCATIONAL COMMUNICATIONS PERSONNEL: THE NEW INTERNATIONALISTS.

Raymond Wyman
THE LONG SLOW ROAD TO TECHNICAL STANDARDS.

Robert McNutt
TOWARDS A WOOLY OBJECTIVE.

SPECIAL ISSUE: VOL. 14 #1

DISTANCE EDUCATION AND EDUCATIONAL TECHNOLOGY
Guest Editor: Robert Barnard, Concordia.

IN UPCOMING ISSUES

Duncan
PREPARING PERSONNEL FOR SCHOOL MEDIA AND LIBRARY SERVICE POSITIONS

Lauchat
MICROCOMPUTER ACQUISITION CONSIDERATIONS

Robertson et al
A CONSORTIUM FOR EDUCATIONAL AUDIO TELECONFERENCING

PAPERS RECEIVED

Baron
MICROCOMPUTERS AND COGNITIVE DEVELOPMENT: THE NEED FOR RESEARCH.

Bennett
RESULTS OF A STUDY TO IDENTIFY MAJOR FIELD TECHNIQUES AND UTILIZATION LEVELS BY CANADIAN INSTRUCTIONAL DEVELOPERS

Ghauremani, et. al.
AN ANALYSIS OF THE COMPUTER RELATED CURRICULUM IN THE EDUCATIONAL TECHNOLOGY PROGRAM AT CONCORDIA

Godfreyson
MICROCOMPUTERS AND EDUCATION

Lacy
BLUE SKIES, GREY CLOUDS, OR FALSE DAWN: EDUCATIONAL APPLICATIONS OF COMMUNICATIONS SATELLITES AND THE PROSPECTS FOR DISTANCE EDUCATION IN AUSTRALIA

Palmer and Tesarowksi
STONY MOUNTAIN DISTANCE EDUCATION PROJECT □

Call for Submissions

A committee of C.S.L.A. is studying resource services to students with exceptional needs. The committee, convened by Avis Thomas, Teacher-Librarian, Special Education Resource Centre, Calgary Board of Education and made up of teacher-librarians with expertise in working with students with exceptional needs, is interested in receiving submissions, articles and/or information regarding resources, both human and material, that meet the needs of students with exceptional needs. Please forward any information and/or articles to:

Avis Thomas, Convenor
Ad Hoc Committee C.S.L.A.
c/o Special Education Resource Centre
930-13 Avenue S.W.
Calgary, Alberta T2R 0L1

If you are interested in working with this committee, please contact Avis Thomas, Convenor at the above address.

IGNACY WANIEWICZ 1925-1984

Died February 21, 1984. Ignacy Waniewicz introduced the first educational television programs in Poland in 1957, and rose to the position of Director of Educational Broadcasting. During the 1960's he served as a Paris-based program specialist in the educational use of radio and television, and worked for UNESCO in Chile, Cuba, Ivory Coast, Upper Volta, Mexico, Egypt, Nigeria, Senegal, Ghana, Great Britain, United States, Switzerland, and Israel. In the late 1960's he moved to Canada, and became Director of the Office of Development Research at TV Ontario. His contribution to the world of educational technology covered adult education, media literacy, television as a tool for lifelong learning, and most recently, educational uses of new technologies.

He was also the Canadian director for a series of UNESCO sponsored studies titled New Technologies in Education which have just been released.

The members of the Association for Media and Technology in Education in Canada extend their sympathy and respect to this leader in our field.

New Literature in Educational Communications

A **Handbook of Computer Based Training,** by C. Dean and Q. Whitlock. Computer assisted instruction continues to be the topic of the day throughout the education field. Here is a handbook which can aid you in the analysis, design, implementation and evaluation of computer based training courses. G.D. Moss, editor of the **British Journal of Educational Technology,** was impressed by the clarity of this work, and hails it as "a lifeline for the floundering; a guideline for the hesitant". This is a 1983 publication of Kogan Page (London), whose Canadian distributor is Corpus Information Services Ltd., 1450 Don Mills Rd., Don Mills, Ontario M3B 2X7.

A **Learner-based Evaluation of Microcomputer Software,** by Vicki Blum Cohen. This is one of several valuable papers in the field of educational technology to emerge from the annual meeting of the American Educational Research Association in Montreal, April 11-15, 1983. It documents a study in which a team of experts at Teachers College, Columbia University, evaluated the quality of educational software. The same software was then given to learners who also evaluated it. Their collective considerations led to the identification of 10 main trends in recent software developments. 12 recommendations for improved software development are also given. The form used for collecting feedback on software is appended to this document, which available in the ERIC Documents collection as ED 233 693.

Communications Software for Microcomputers, by Janet L. Bruman. This booklet outlines the major functions of microcomputer communications software packages. Terms such as downloading, protocol and keyboard macros are explained. Suggestions are also made on some ways in which these

(Continued on page 9)

Send news items for this column to:
Joe Connor
News Editor, CJEC
c/o D. Hlynka
University of Manitoba
R3T 2N2

COMPUTER NEWS

Icon Update:

In the January issue of CJEC, It was indicated that the Ontario government was to massively support CEMCorp (110 million on hardware alone) and would subsidize the purchase of said equipment by Ontario schools. In order to introduce the ICON to market widely, quickly, and cheaply, the Ontario Ministry of Education instituted a "seeding" technique consisting of 2 phases. CEMCorp was to have followed this up with a third phase of its own.

Phase 1 began in January and allowed the placement of complete ICON systems at 20 test sites at a cost of $2 million. These sites ranged from urban centres to remote northern schools in order to assure a wide range of test conditions. Phase 2 was to offer a subsidy program (ending in February) under which school boards could purchase an ICON system ($16 380) for just over $4000. A system consists of 3 ICON stations-one with colour monitor, the other two with monochrome-and a single Lexicon "fileserver".

CEMCorp was to follow this up with a reduced price of $3000 per ICON station and $7670 for the Lexicon fileserver until the end of April before selling the equipment at retail rates beginning in May.

Bionic IBM

IBM Canada has entered the educational computer fray in Ontario with plans to build a computer that would meet the specifications of the Ministry of Education, placing it in competition with CEM Corp., designs of the Icon ('Bionic Beaver'). The computer would probably be a redesign of the IBM PC or XT; it is unlikely that the PCjr could be adapted to meet the specifications.

Comal 80 Standardisation Meeting

An expanded draft standard of the Comal 80 programming language was agreed upon in Copenhagen, Denmark on December 3, 1983. All current developers of Comal 80 systems came together to define and maintain a common standard for the Comal 80 language. The Copenhagen meeting welcomed three new members to the group, a fact which illustrates the rapidly spreading interest in Comal 80. Implementations now exist for mainframes and micros, as well as for many home computers.

Representatives of the following companies took part: Acornsoft (England), Dansk Data Elektronik a/s (Denmark), Esselte Studium/TELI (Sweden), Metanic Aps (Denmark), a/s Regnecentralen af 1979 (Denmark), TCD Software Engineering Laboratory (Ireland), Unicomal/Commodore (Denmark).

The meeting was chaired by Borge Christensen, internationally known as the originator of Comal, a language combining the structure of Pscal with the friendliness of BASIC. Comal 80 is a coherent and well-designed programming language; the implementors cooperate in the Comal 80 Standardisation Group so that the language will continue to evolve in a controlled manner, preventing the proliferation of many incompatible dialects. Instead, programs written according to the standard will be portable across all implementations.

Copies of the draft standard may be obtained, at a cost of £5, from the Secretary of the Standardisation Group, Department of Computer Science, Trinity College, Dublin 2, Ireland.

Control Data Software

Control Data Canada has announced a major move into the microcomputer market for educational software. More than 20 years of development has produced 13,000 hours of large-scale computer-based educational software, and Control Data has initiated its adaption to microcomputers. CIE will be reviewing their Plato series of software in an upcoming issue.

Voice Input Module Field Test Results

Dr. Alonzo E. Hannaford from the Special Education Department of Western Michigan University recently completed an evaluative field study for MCE Inc. in Kalamazoo, Michigan on the Voice Input Module. MCE Inc. is a nationwide distributor of this voice recognition device for Apple microcomputers.

The Voice Input Module permits individuals to run software (including electronic spreadsheets and word processing programs) as well as to program by voice alone — thus bypassing the keyboard. This device can be used effectively to run all software designed for the Apple II, Apple II+, Apple IIe, and Franklin microcomputers.

Hannaford's field study for MCE observed and interviewed physically handicapped teenagers as they learned how to operate the Voice Input Module and as they used it to run a variety of software packages.

For more information on the voice Input Module and the results of this field study contact MCe Inc., 157 S. Kalamazoo Mall, Suite 250, Kalamazoo, Ml 49007.

Last Column

This will be the final COMPUTER NEWS column edited by Mr. Richard Kenny. The column will be temporarily suspended until a new editor can be found. Mr. Kenny informs us that other pressing commitments are such that he must reluctantly give up his work for CJEC. We would like to take the opportunity to thank Rick for his invaluable addition to our journal over the past two years. His column has been well received and has played an integral role in informing AMTEC readers what is happening in the microcomputer world. Good luck, Rick, in your future endeavors.

— D.H.

(Continued on page 14)

CJEC EDITOR

The current position of editor of the Canadian Journal of Education expires Fall 1985. So that continuity between editors is maintained, the new editor will act as associate editor for the year preceding.

The position allows the individual an opportunity to become actively involved in the mainstream activity of educational technology in Canada.

A search committee has been established, and will meet with potential applicants during the London conference in June, 1984.

Submit references to Bill Hanson, AMTEC president-elect, or to D. Hlynka, CJEC editor, Faculty of Education, University of Manitoba, R3T 2N2.

Impact of a LOGO Program on Native Adults

By J.O. Michayluk
and
R.A. Yackulic

Abstract

This paper examines some of the important research related to Seymour Papert's LOGO computer program. Drawing upon the review of the current research, in an original exploratory research project involving second year university students of native origin, the authors attempt to come to some general conclusions about the applicability of LOGO in educational settings. In addition, the possible use of LOGO in Third World countries is examined and discussed.

Introduction

The LOGO computer program has been developed by the MIT LOGO Group over the past number of years. Seymour Papert has been the most dominant force within the Group (Papert, 1972a, 1972b, 1972c, 1980; Papert & Solomon, 1972), and, in fact, is generally credited with the marriage of the Piagetian and cybernetic concepts which have led to the birth of LOGO (Groen, 1978; Larivee & Michaud, 1980).

LOGO was originally created by Papert for children; consequently, it incorporated an easy to learn, but rich and expandable, vocabulary to reflect such key computer science ideas as local and global variables, naming, recursion, and procedurization. Having developed LOGO for children, Papert and his colleagues then looked to it as a provider of an evironment in which a subject could learn by doing, and by thinking about what he/she had done, develop "great ideas" in the Piagetian sense (Papert, 1980).

The interest in LOGO as a research tool was immediate and varied. Since its development, LOGO has been used with students of all ages (including those at graduate schools; it has also been tried with the physically handicapped, the learning disabled, the emotionally disturbed, the gifted, and the delinquent (Watt, 1982). In educational settings, the research has ranged from providing an environment for experiential learning of mathematics to the formation of a foundation for a new type of school based on Piagetian approaches to teaching and learning, using computers. Although it is clear that something important has happened here, the exact role that LOGO and its related activities have to play has not yet been fully delineated. Groen (1978) in his article on Piaget stated that while LOGO was a well defined environment, it was unclear as to what should be done with it. The literature appears to bear out this assertion.

J.O. Michayluk & R.A. Yackulic are faculty members in the Department of Educational Psychology, University of Saskatchewan, Saskatoon, Saskatchewan.

Review of the Literature

Each time LOGO has been used for researches purposes, certain objectives have been emphasized and others ignored. Some studies, for example, emphasized an observational or case study approach (e.g. Watt, 1982; Solomon and Papert, 1976; Lawler, 1980); others attempted to include an objective measurement component (e.g. Milner, 1973; Statz, 1973; Howe, O'Shea, and Plane, 1974). The general conclusion reached by most of the studies was that the full potential of LOGO had not been realized and that more diverse research was needed.

The literature further indicated that during the last few years the use of LOGO in the schools had increased dramatically. For the most part, studies have concentrated on problem solving and mathematical skills. In general, research into the effects of LOGO on mathematical skills have been disappointing. For example, Milner (1973) found LOGO did little to change grade five mathematical skills or concepts. Howe, O'Shea, and Plane (1974). in a very elaborate study at Edinburg, found that, although the LOGO group scored higher on a test of general mathematics, the control group scored significantly higher on a mathematics attainment test. Statz –(1973), expanded her study to investigate the effect LOGO had on the acquisition of certain computer-related concepts by children. She tested six hypothesis related to the concepts of procedure, recursion, variables, conditionals, & editing and found that the LOGO students scored better on only the recursion aspect of the study. And finally, in a study using grade five subjects, Seidman (1981) found that there were no significant differences between his LOGO and his control subjects, using traditional conditional reasoning tests; however, he did report that the LOGO groups scored consistently higher on tests measuring the inversion-fallacy principle, leading him to speculate that LOGO might be inversion specific.

Perhaps more interesting was Seidman's (1981) discovery that the control group scored significantly higher on a post-test using a standarized reading achievement test. Although the reasons for these startling results are not clear, the possible educational implications of the above results, if they are proven correct, are obvious and important.

If the results based on objective data are inconclusive, the opposite appears to be true when one considers the observational data. Virtually all of the studies (Milner, 1973; Seidman, 1981; Abelson et al., 1976; Watt, 1979, 1982; Solomon and Papert, 1976; Weir, 1979) agree that LOGO does improve a subject's reasoning and problem solving skills. Howe, O'Shea, Plane (1974), for example, reported that LOGO subjects discussed and argued more sensibly. Milner (1973) indicated that teachers reported better problem-solving strategies used by the LOGO groups. Other studies (Watt, 1982; Goldstein and Miller, 1976) basically echoed the same ideas.

As mentioned earlier, LOGO has also been used with a variety of special populations. LOGO has been used with handicapped and learning disabled students (Weir, 1979; Watt and Weir, 1981; Papert and Weir, 1978) with some encouraging results. And Austin (1976) concentrated on teaching teachers LOGO programming, finding in general that teachers were less willing to try new ideas than children.

Another rather interesting approach using LOGO has been advocated by Larivee. Drawing on his doctoral work with Piaget on the subject of delinquent children, Larivee has come to the conclusion that LOGO may be used as a therapeutic tool with juvenile delinquents. Noting that deliquents are often concrete operational thinkers and incapable of either seeing or resolving contradictions, Larivee and his collaborators (Larivee and Michaud, 1980; Larivee and Gendreau, 1980; Larivee, 1979, 1980, 1981) have suggested that the LOGO program be used in conjunction with traditional therapy to hasten the therapeutic process with juvenile deliquents. Larivee hypothesized that becoming a formal operational thinker (via LOGO) capable of abstract and retroactive thinking, would lead to a quicker and more complete readaptation.

One can draw several conclusions from these diverse studies. Although satisfactory objective data appears to be lacking, observational data suggests that LOGO can be effective with most populations. Another conclusion one can draw comes from the experiences of the Brookline Project (Howe, O'Shea, & Plane, 1974), showing that teacher training and availability of resource materials are absolutely critical to the success of any LOGO project. This, in turn, brings restraining economic considerations to the forefront, and perhaps contradicts the somewhat idealistic picture of the future given to us by Papert (1980).

THE LOGO PROJECT

Method

Interest in the LOGO program led to the establishment of an exploratory research project using second-year university students of native ancestry. Since LOGO was expected to influence students' reasoning processes, it was decided to incorporate a LOGO-based component in one of the courses being taught. The impact of LOGO on the students was monitored closely using both personal interviews and a formal test.

The course itself was a required component in the second year teacher training program for native students. Students were told that the course had been expanded to include a unit on Apple LOGO, and that, although the unit was optional, completion of the unit would be weighted in the final grade. All 15 students decided to participate in the LOGO project, although one student was later excluded for health reasons. Students were then given a brief introduction to LOGO in a lecture setting prior to their first computer session. The first computer session for each student was closely supervised by one of the authors and involved an introduction to the Apple micro-computer, LOGO, and the LOGO manual. Students were then encouraged to work through the manual on their own.

The ten hours each student spent working on LOGO was directed toward the completion of four tasks: acquisition of skills in LOGO, completion of a procedure involving recursion, completion of a game project, and completion of an original graphics project. Although the instructor answered LOGO questions during classes and some assistance was available in the computer lab, students generally were responsible for completing the LOGO unit on their own. Four students, after completing the first terminal session, decided to drop out of the project. The remaining ten students who completed the project averaged 7 computer sessions each. Computer sessions typically lasted 1½ hours.

The Results

A major advantage of LOGO is its purported impact on reasoning strategies (Papert, 1980). It was hypothesized that native students would be similar to other comparable students; that is, some of them would be functioning at Piaget's concrete or transitional stage (Birnie & Michayluk, 1979). It was hoped that participation in the LOGO project would facilitate development of formal strategies. In order to monitor the potential impact of LOGO, the Logical Reasoning Test (Burney, 1974) was administered to the students both prior to and on completion of the LOGO project. The time between tests was 11 weeks.

The Logical Reasoning Tests purports to roughly categorize students as Concrete (0-7), Transitional (8-13), or Formal (14-21). Of the ten students completing the project, five were categorized as formal on the first testing, three as transitional and two were classed as concrete thinkers. The four subjects who withdrew from the study were all classified as concrete or transitional thinkers.

The results of both tests are reported in Table I. As anticipated, students became slightly more formal in their reasoning and thinking during the course of the project.

TABLE I

SUMMARY OF LOGICAL REASONING DATA
(N = 10)

Measure	Mean	Standard Deviation
Log Reas T1	11.2	3.88
Log Reas T2	12.9	3.07
		t = 2.55
		(df = 9, p < .05)
No. LOGO Files	7.00	4.64

Correlations

	Log Reas 2	No. Files
Log Reas 1	.841	.469
Log Reas 2		.623

Discussion

The experimental methodology used in this project is inadequate to attribute the favourable results to LOGO. Not only was the sample size small, there was also no attempt to control for a variety of factors including selection, maturation and testing. Nonetheless, it is reasonable to suspect that the LOGO experience, or at least the computer contact, favourably influenced the students' reasoning strategies. This suspicion was further supported by student comments during interviews. Students completing the project unanimously stated that the exposure to LOGO changed the way they approached problem solving and reasoning. The two computer concepts most often mentioned in connection with these statements were "editing" and "de-bugging". As well, students reacted positively to the individual nature LOGO. Some learned the concepts faster than others and very quickly became tutors for the ones still having difficulties.

It might be of interest to the reader to know that the authors **observed** a relationship between the first Logical Reasoning Test scores and ability to understand computer concepts explained during the training sessions. Most of the subjects with concrete and transitional scores had some difficulties in understanding how the turtle worked; several showed signs of actual frustration, and, eventually dropped out.

The number and complexity of files saved by each student was also monitored. In general, students saved a file after each computer session. Average number of files was 7 (S.D. = 4.54). Although the correlation between number of files saved and Logical Reasoning (Post) appears large, it was not significant (Table I). A review of the students' files revealed that they adhered closely to the LOGO manual for most of their procedures. With one exception, the final graphics projects were simplistic in nature, consisting of trucks, apartment buildings and similar block shapes. The one exception, by a male student who coincidentally scored highest on the Logical Reasoning Test on both occasions, consisted of a complex, detailed bicycle.

Some General Conclusions

1) LOGO is a language for learning; it is also a language for learning to think. Because of this, the authors have come to the general conclusion, based on the literature and this project, that LOGO can be effective for most students in an educational setting. In fact, students who were previously unsuccessful in school,

might experience success with LOGO (Watt, 1982). Another positive element related to interaction has led to students themselves taking on significant roles as teachers of other students. This was evident in the native student project mentioned earlier; the students who "caught-on" first, aided the others.

2) LOGO is designed to make computer programming as easy as possible to understand. For this reason, LOGO is an effective program for teaching and achieving computer literacy. The problem here is where does one go after attaining computer literacy? This was a question asked by the native students in this project. They exhibited some confusion as to what they should do next in the micro-computer world into which they were introduced by LOGO.

3) As mentioned earlier, to be effective, teacher preparation and availability of LOGO materials is critical. Establishing a properly run LOGO project could become quite costly and time consuming, and, perhaps, beyond the financial means of some jurisdictions. If one combines the cost factor with the general weakness of the object data, researchers may find that LOGO as an educational tool, may be difficult to sell to administrators.

4) On the surface, LOGO appears ideal for introduction into the Third World. Easy to use and interesting, it seems an ideal way to introduce computer technology into developing countries. One of the problems, however, seems to be one of cost. As indicated above, LOGO projects might be quite expensive to operate. One is also reminded of Nehru's statement to the effect that it is insulting to talk of aesthetics and culture to a population which is starving. Similarly, it may be just as insulting to speak of high technology to comparable populations. The idea of LOGO in the Third World, no matter how attractive on the surface, should be carefully studied to decide whether or not money spent on LOGO there is indeed the best use of resources.

Another problem associated with introducing LOGO into developing countries has to do with the impact of industrialized educational technology on any culture. Pena (1983) points out that one of the reasons why educational technology has failed in Latin America is that educators did not take this impact of technology into account. He further points out that the impact of technology (such as computers) has been more seriously disruptive in dependent Third World Societies because these societies, instead of having evolved and developed at their own natural rate, have developed as a result of forced updating from the outside. This has tended to turn them into dependent people who do not live for themselves but for others. It seems apparent that if LOGO, an industrialized technological development, is to be applicable in the Third World, then it has to be modified to incorporate valuable contributions already existing in the various cultures. This was a sentiment echoed by several of the native students in the LOGO project described in this paper; they expressed discomfort, even conflict, with a technology for which they were not prepared by their culture. As Pena (1983) stresses, change in the Third World will have to evolve slowly and start from what already exists, in spite of the apparent urgency. The ending to his paper seems an appropriate one for this paper:

> A development built on the principle that technology is an autonomous reality, whose rationality must be imposed on the people, is utterly false. The technology which could open roads of educational transformation in Latin America would be that which manages to establish a balance between the modernization thrust undoubtedly required by education and the system of values of the people whose lives are affected deeply by the technological innovations.
>
> (Penna, 1983, p. 20)

REFERENCES

Abelson, H., Bamberger, J., Goldstien, I., & Papert, S. **Logo progress report 1973-1975.** National Sciences Foundation, Washington, D.C., March, 1976.

Austin, H. **Teaching teachers logo: the Lesley experiments.** Logo Memo No. 23, MIT AI Laboratory, Cambridge, April 1976.

Birnie, H., & Michayluk, J. **A comparison of a paper and pencil test for assessing formal-operational reasoning and their relationship to selected variables.** Paper presented to the Canadian Society for Studies in Education, Saskatoon, 1979.

Burney, G.M. **The construction and validation of an objective formal reasoning instrument.** Unpublished doctoral dissertation, University of Northern Colorado, 1974.

Goldstein, I.P. & Miller, M.L. **AI based personal learning environments: directions for long term research (AI Memo 384).** MIT AI Laboratory, Cambridge, December, 1976.

Groen, G. The theoretical ideas of Piaget and educational practice. In P. Suppes (Ed.), **Impact of research on education: some case studies.** Washington, D.C., National Academy of Education, 1978.

Howe, J.A.M., O'Shea, T., & Plane, F. **Teaching mathematics through Logo: an evaluation study.** DAI Research Paper, No. 115, September, 1979.

Larivee, S. Analyze fonctionnelle de l'intelligence des enfants deliquants. **Apprentissage et societisation,** 1979, **3** (2), 163-192.

Larivee, S. Quelques retombies clinique du paradigme Piagetian. **Cashiers Pedopsychiatrique,** Automne 1980, **14,** 41-77.

Larivee, S. Le scheme de la combinatoire: un scheme adaptatif. **Bulletin AMQ,** Mars 1981, 3-11.

Larivee, S., & Gendrea, G. Piaget et la reeducation. **Apprentissage et socialisation,** 1980, **4** (3), 301-214.

Larivee, S., & Michaud, N. L'ordinateur au secours de l'inadaptation. **Revue des sciences de l'education,** Automne 1980, **3** (VI), 451-472.

Lawler, R.W. **Extending a powerful idea** (Memo No. 590). MIT AI Laboratory, Cambridge, July 1980.

Milner, S. **The effects of computer programming on performance in mathematics.** Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, February 1973.

Papert, S. A Computer laboratory for elementary schools. **Computers and Automation,** 1972, **21** (6). (a)

Papert, S. Teaching children thinking. **Programmed Learning and Educational Technology,** 1972, **9** (5), 245-255. (b)

Papert, S. Teaching children to be mathematicians versus teaching about mathematics. **International Journal of Mathematics Education and Science Technology,** 1972, **3,** 249-262. (c)

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

Papert, S., & Solomon, C. Twenty things to do with a computer. **Educational Technology,** April 1972, pp. 9-18.

Papert, S., & Weir, S. **Information prosthetics for the handicapped.** Logo Memo 51, MIT Logo Group, 1978.

Pena, Bernardo Luis, Educational technology: its impact on culture. **Educational Technology,** 1983, **2** (23), 17-21.

Seidman, R.H. **The effects of learning a computer programming language on the logical reasoning of school children.** Paper presented at the Annual Meeting of the American Educational Research Association, Los Angeles, April 1981.

Statz, J.A. The development of computer programming concepts and problem solving abilities among ten-year-olds learning Logo. (Doctoral dissertation, Syracuse University, 1973). **Dissertation Abstracts International,** 1973, **34** (11), P5418.

(Continued on page 15)

LOVE'S LABOUR'S LOST

A Primer for Educational Technologists

By Dr. Denis Hlynka, Editor, CJEC

The AMTEC 1984 conference entertainment night on Tuesday June 17 features a visit to Canada's famed Stratford theatre to see William Shakespeare's early comedy, Love's Labour's Lost. For AMTEC members who may not have had time to "brush up their Shakespeare", to borrow from Cole Porter, we offer the following commentary and summary.

Of course, it would really seem stretching a point too much to claim that LOVE'S LABOUR'S LOST was just the right play for educational technologists, yet oddly, we can *almost* make just such an assertion.

* * *

A contemporary theme in educational technology today involves the relationship of scientific and/or aesthetic methodologies towards improved practice in our field. Most notably, Ivor Davies has argued for a three-stage definition of educational technology which he calls ET-1, an "audiovisual" approach; ET-2, a "systematic" approach, and ET-3, a wholistic, Gestalt, aesthetic, or "systemic" approach.

The dichotomous theme of science vs art is not a new one. Medieval historians note the concern in England of the 11th century that pollution was swallowing the city of London. The pollution referred to was smoke pollution from the burning of wood, a problem which simultaneously threatened to deplete the major forests of the country.

The great exposition of 1851 in London created the Crystal Palace as the ultimate technological symbol, while in 1889 Alexander Eiffel designed the competing French symbol for the Paris Exposition of that year, now known as the Eiffel tower, and symbolizing man's ability to conquer the world through technology.

Reaction set in as first expressed by Henry Adams in "The Virgin and the Dynamo" in which he metaphorically contrasted images of Christianity with those of an industrialized society.

Art, too, reflected "the shock of the new" in multitudinous ways, in the works of Picasso, Braque, Cezanne . . . and then a flood of "isms" as modern art attempted to come to terms with technology. Music changed from romanticism to a stumbling mechanistic exploration of the technological world: Honnegger in France wrote PACIFIC 231, a tone poem rhapsodizing over a steam engine; Meitus in Ukraine wrote DNIEPER DAM, which musically illustrated the digging of the foundations for the great hydroelectric station built in Ukraine in 1932 at Zaporyzhya.

Contemporary analysis of the art/science question is commonly dated to C.P. Snow's analysis of "The Two Cultures", a debate which appears not to have subsided.

And in education, as recently as April of 1984, the prestigious education journal Phi Delta Kappan posed the same dichotomy within an educational perspective: Will educational research inform practice?

* * *

It has been said that there is an answer to everything in Shakespeare, and so, it is perhaps not surprising that the theme of LOVE'S LABOUR'S LOST is precisely that same art/science dichotomy. For Shakespeare, "art" is methaphorically represented by love; "science" is learning, education, or simply, study. Thus we have a tale which places love and education in counterpoint against each other.

Three attitudes towards love are identified. The men from Navarre believe that love can be controlled, and even ignored. Indeed, they determine to spend three years in study, away from the society of ladies. The ladies show a second attitude. They feel that love cannot be denied. And the third view is that of physical love, represented by the characters of Don Armando, Jaquenetta, and Costard.

The play also suggests two attitudes towards study. First, study is perceived as a tough rigorous discipline. Study is abstract, and not relevant to the everyday world. The world of Academe has no room for frivolity. Yet study will "make us heirs of all eternity."

When most of the characters in the play find this view untenable, Biron suggests, with a flourish of philosophic logic, that the truest study is to be found in a woman's eyes. "For where is any author in the world teaches such beauty as a woman's eye?" True education needs true love.

THE MAJOR CHARACTERS:

KING FERDINAND OF NAVARRE.
BIRON, LONNAVILLE, AND DUMAIN. Gentlemen of Navarre.
DON ADRIANO. A pedantic fool.
COSTARD and MOTH. Clown and page, respectively.
THE PRINCESS, ROSALINE, KATHERINE, AND MARIA. Counterparts to Biron, Lonnaville, and Dumain.

THE STORY

Act I. King Ferdinand of Navarre and his three close friends have determined to spend the next three years in study. This means no pleasures, no "huge army of the world's desires," and most of all, no ladies. Biron, one of the three, hesitates, suggesting that the oath will be hard to keep. Also, he points out, the Princess of France and her train are to visit shortly. Then we shall make an exception, proclaims the king. No! says Biron, and he promptly signs the oath!

Now a series of comic characters are introduced. Dull, the constable has caught Costard the rustic with Jaquenetta the dairymaid. A letter accusing Costard, has been written, full of "fire-new words", by Don Adriano. Indeed, everyone seems to misuse words. The king selects the punishment . . . Costard must fast. Later, in the final scene of act one, Don Armando reveals that he is in love with Jaquenetta; she in her turn, is overwhelmed by his apparent erudition.

Act II. The princess of France and her ladies now arrive. She soon finds out that each of them is in love with one of the King's nobles: Rosaline loves Biron, Katherine loves Dumain, and Maria loves Longaville. Because of the oath, the ladies are not allowed indoors. Instead the King and his three

(Continued on page 15)

Computer Resource Booking: A Development

By Donald P. Bates

In September 1983, the Media Centre of the Grey County Board of Education went "live" with a computer booking system tailor-made for resource distribution. Though this is not unusual for larger jurisdictions, it is usually beyond the reach of smaller boards such as ours: The project became a reality through a cooperative venture. What follows is an overview of the process which led to software development to be used in eight Ontario boards.

The demands on 16mm film and other centralized resource libraries have been increasing in spite of the declines of school population. The Grey County Board of Education, a smaller rural school jurisdiction in Ontario, is no exception with resource distribution increasing some 60% since 1976. This situation was coupled with the reality that the Board is not in a position to add staff to address the problems brought on by these increases. In considering alternative solutions, the possibility of easing the workload pressure of resource handling by transferring much of the manual clerical work to computer intrigued me.

The project began with a study of operative systems in other school jurisdictions and colleges. It seemed obvious that for a library the size of Grey County to offer the same services we do now of reservation and multiple bookings per title, a system of some capacity would be required. Hence microcomputers were considered less desirable but seemed to be the only facility remotely within our fiscal reach.

Coinciding with my consideration of the problem was expansion and development within our Board's Computer Service Department. Grey County established a computer service in the early 1980's. It was a facility set up in conjunction with the Ministry of Education to provide essential computer services for this and surrounding boards. These installations were known as CRJE sites (Cooperative Remote Job Entry), essentially terminal links with the Ministry's mainframe in Toronto some 140 km. The local board's staff managed several standardized programs related to business functions and student guidance services. The facilities were not interactive, hence not suited to on-line booking resources.

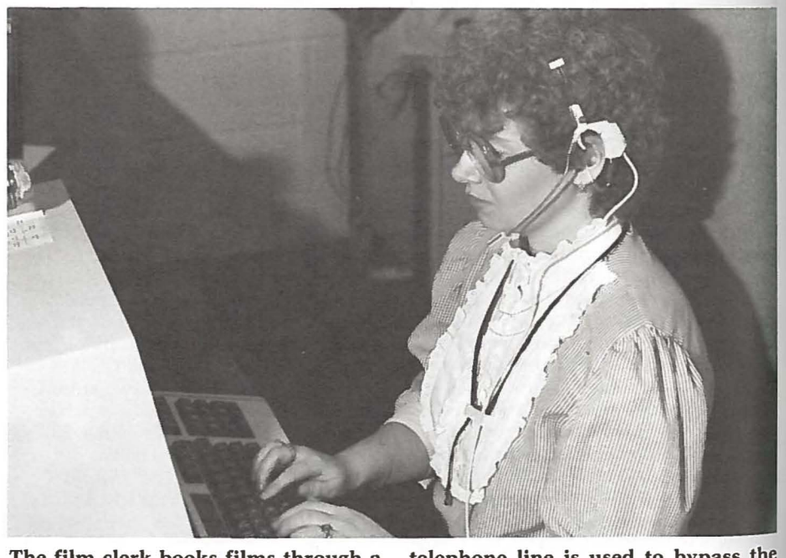
But changes were coming. The boards working with the Ministry of Education to provide a network of computer services in the province were considering a move toward minicomputers at such terminal sites. The facility would allow localized computing as well as maintaining some of the benefits of networking. Standardizations of hardware would allow development of programs at the Ministry level for use throughout the province. A decision was expected early in 1982.

Arthur Docherty, Manager of Systems and Planning with Grey County Board of Education, and I discussed my department's needs in light of the pending decisions on computer hardware and formats. It was decided I would poll media personnel and/or directors of education of Ontario school boards to try to identify jurisdictions with mutual interests; my enquiry would also determine possible interest in working cooperatively to develop software. Arthur, on the other hand, would sound out his associates of the Educational Computing Network of Ontario (ECNO) to determine support from the Ministry of Education and other boards.

By mid-March there was enough of an indicator that interest warranted further discussion. Jim Henderson, Management Information Systems Branch of the Ministry of Education and a member of ECNO, agreed to arrange a meeting of representative media and computer personnel for June 1982, from Northumberland and Newcastle, Nipissing, Lakehead, Essex, Windsor, and Grey County boards of education. Among the results of this meeting were guidelines for a fall working session to consider specifics.

Again, Jim Henderson of the Ministry of Education acted as a resource person, making arrangements to study two operative systems as part of an October meeting, i.e. boards of education in Wellington and Waterloo Counties. The agenda also included a review of various possibilities and the drafting of criteria which would provide the flexibility/adaptability needed to be useful to a variety of media services, including such things as variable courier schedules, different loan policies, and the like. Finite terms of reference for the needed software and clear direction for production, including timelines, came out of the meeting.

Waterloo County, one of the pioneers using the computer to book learning resources, was facing a major rewrite problem to convert to their new VAX facilities as part of the standardization of hardware referred to above. Both Learning Resources and Computer Services Departments expressed interest in becoming involved in the development of the program; the ECNO Committee could see the advantage of including a partner who would bring media experience into the design. With criteria identified, a proposal was prepared and the computer services personnel at Waterloo accepted the challenge of design and writing. Boards committed to participating at this initial



The film clerk books films through a friendly negotiation with a school level liaison. A direct INWATS telephone line is used to bypass the busy central switchboard.

Don Bates, Coordinator of Educational Media for the Grey County Board of Education since the service was established in 1968, holds a Graduate Diploma in Education: Audio Visual from the University of Alberta (73) and an Ontario Ministry of Education Media Specialist Certificate (81).

COURSES IN

MICROCOMPUTERS IN EDUCATION IN CANADIAN UNIVERSITIES

COMPILED BY
LEN PROCTOR
RICHARD SCHWIER
BARRY BROWN

DEPARTMENT OF EDUCATIONAL COMMUNICATIONS
UNIVERSITY OF SASKATCHEWAN

PRODUCED AS A SUPPLEMENT TO THE
CANADIAN JOURNAL OF EDUCATIONAL COMMUNICATION
EDITOR: DENIS HLYNKA
JUNE, 1984

INTRODUCTION

This document represents the first compilation of courses offered in Canadian Universities on the topic of Microcomputers in Education. As this area of our discipline expands, as reflected in university curricula, so will this listing. The editors anticipate providing an annual review of such offerings, which can be used by media professionals across Canada to counsel students, and to reflect on national trends and changes in this important, emerging area.

ACADIA UNIVERSITY

Inquiries: Dr. Norman Watts, School of Education, Acadia University, Wolfville, Nova Scotia, B0P 1X0.

COMPUTERS IN EDUCATION: This course offers an introduction to the computer and to the uses of the computer in education. The major emphasis of the course is the use of the computer in curriculum and instruction. The objectives of the course are: understand the components and functions of a microcomputer system; operate a microcomputer system; understand how programs work; develop simple computer programs and modify existing ones; evaluate and select microcomputer software for classroom use; understand different uses of the computer in education; understand how to implement computers in instruction. EDUCATION 4466; Credit; Undergraduate; 24 Weeks; Fall, Winter.

UNIVERSITY OF BRITISH COLUMBIA

Inquiries: Dr. David F. Robitaille, Head, Department of Mathematics and Science Education, Faculty of Education, 2125 Maim Mall, University of British Columbia, Vancouver, B.C. V6T 1Z5.

MICROCOMPUTER PROGRAMMING I: Uses of microcomputers in education; introduction to programming. CSED 217; 1.5 Credit; Undergraduate; 13 Weeks; Spring, Fall, Summer.

MICROCOMPUTER PROGRAMMING II: Advanced programming in at least two microcomputer languages; educational system development. CSED 317; 1.5 Credit; Undergraduate; 13 Weeks; Fall, Summer.

INSTRUCTIONAL USES OF MICROCOMPUTER: Development and use of computer assisted instructional units in specific subject matter areas. Psychological and sociological foundations for microcomputer applications in education. CSED 417; 1.5 Credit; Undergraduate; 13 Weeks; Fall, Summer.

COMPUTERS IN EDUCATION: Current research and practice concerning uses of computers in education, including computer-assisted instruction and computer-assisted instruction and computer-augmented instruction. CSED 400; 1.5 Credit; Undergraduate; 13 Weeks; Fall.

CURRICULUM AND INSTRUCTION IN COMPUTER SCIENCE (Secondary): Curriculum planning; teaching methods and strategies. Pre-requisite: a completed concentration or major in Computer Science. CSED 404; 1.5 Credit; Undergraduate; 13 Weeks; Fall,.

SEMINAR IN THE TEACHING OF COMPUTING STUDIES: Curriculum instruction and organization of computing studies courses in the secondary school Prerequisites: Education 491 or extensive experience with teaching computing studies in the schools. CSED 546; 1.5 Credit; Graduate; 13 Weeks; Fall, Summer.

SPECIAL COURSE IN SUBJECT MATTER FIELD: Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field. CSED 565; 1.5/3 Credit; Graduate; 13 Weeks; Spring, Fall, Summer.

PROBLEMS IN EDUCATION: Investigations and report of a problem. CSED 580; 1.5/6 Credit; Graduate; 13 Weeks; Spring, Fall, Summer.

REVIEW OF RESEARCH IN EDUCATIONAL METHODS: Studies are made of recent research bearing on educational practice. The focus of each course differs according to the special interest of the department in which it is offered. CSED 508; 1.5/3 Credit; Graduate; 13 Weeks; Spring, Fall, Summer.

EVALUATION OF COMPUTER-BASED INSTRUCTIONAL MATERIALS: Types of computer assisted instruction, identification of critical attributes, analysis of techniques for evaluating these materials. CSED 520; 1.5 Credit; Graduate; 13 Weeks; Spring, Fall, Summer.

DEVELOPMENT OF COMPUTER-BASED INSTRUCTIONAL MATERIALS: Techniques of presentation, response analysis, reprisal, individualization, data management, course management. Course planning and developmnt. CSED 530; 1.5/3 Credit; Graduate; 13 Weeks; Spring, Fall, Summer.

BROCK UNIVERSITY

Inquiries: Dr. R. Crane, Associate Professor, College of Education, Brock University, St. Catharines, Ontario L2S 3A1.

MICROCOMPUTERS IN THE CLASSROOM (Parts 1, 2): Programming, literacy, BASIC, LOGO, CAL, system design, spread sheet, word processing, simulations, futures. ED 461, ED 462; Credit; Graduate; 24 Weeks; Spring, Fall, Summer.

CONCORDIA UNIVERSITY

Inquiries: Dr. Gary Boyd and Prof. Jesus Vazquez-Abad, Concordia University, Department of Education, 1455 de Maisonneuve Blvd. West, Montreal, Quebec H3G 1M8.

MODELLING, SIMULATION AND INTELLIGENT TUTORING SYSTEMS: To provide an introduction to

modelling and simulation in educationl computing; to provide an introduction into the theoretical and practical aspects involved in the development of computer-based adaptive-teaching systems. ETEC 665; 3 Credits; Graduate; 13 Weeks; Spring.

COMPUTER ASSISTED INSTRUCTION: Study of merits and weaknesses in the various CAI projects and systems; preparation and try-out of a CAI conversational programme; preparation of flow-chart illustrating the interdependence of major processes involved in developing and producing CAI course modules. ETEC 564/664; Credit; Graduate; 13 Weeks; Spring.

SMALL COMPUTER SYSTEMS AND SOFTWARE FOR TEACHERS AND TRAINERS: The objective of this course is to enable teachers and trainers to select and use small computers for instructional and managerial purposes. Considerable emphasis is placed on the evaluation selection and customizing of existing studyware and other software. ETEC 563/663; 3 Credits; Graduate; 13 Weeks; Spring, Fall, Summer.

COMPUTER BASED SYSTEMS IN EDUCATION AND TRAINING: The course surveys the application of currently available computers and services to the needs of educational and training administrators, instructional media producers and learners. The emphases are on process knowledge and project and vendor evaluation. ETEC 562/662; 3 Credits; Graduate; 13 Weeks; Spring.

INTRODUCTION TO EDUCATIONAL COMPUTING: An introduction to educational problem-solving and programming using computer languages BASIC AND LOGO. ETEC 560/660; 3 Credits; Graduate; 13 Weeks; Spring, Fall, Summer.

UNIVERSITY OF GUELPH

Inquiries: Prof. W. Pfeiffer, School of Agricultural Economics and Extension Education, University of Guelph, Guelph, Ontario N1G 2W1.

PRODUCTION ECONOMICS: Economic analysis of production and resource use in agriculture. Emphasis is placed on decision-making by means of economic theory, linear programming, game theory, and budgeting. 02.329; Credit; Undergraduate; 13 Weeks; Spring.

ADVANCED FARM MANAGEMENT: Identification and analysis of problems and opportunities for development of successful management strategies. Farm business analysis, computerized farm planning models and decision theory applied to selected Ontario farms. 02.422; Credit; Undergratuate; 13 Weeks; Spring.

Inquiries: Prof. P. Farragher, School of Agricultureal Economics and Extension.

COMMUNICATIONS: Introduction to the study of the communication process and its application to the needs of business and organizations. 38.023; Credit; Associate Diploma; 13 Weeks; Spring.

TEACHING AND LEARNING IN EXTENSION EDUCATION: Learning principles, theories and practices in extension education. Emphasis is on non-formal teaching-learning situations. 38.310; Credit; Undergraduate; 13 Weeks, Fall.

MICROCOMPUTERS IN EXTENSION: Credit; Undergraduate; 13 Weeks; Fall.

COMPUTER BASED LEARNING SYSTEMS: Selected study topics which may be pursued in accordance with the special needs of studies in the program. 38.629; Credit; Graduate; 13 Weeks; Spring, Fall, Summer.

NEW TECHNOLOGY AND ITS IMPORTANCE IN EXTENSION/ADULT AND CONTINUING EDUCATION: Review of selected themes in adult, continuing, and extension education. Students will present seminars on assigned topics. 38.630; Credit; Graduate; 13 Weeks; Spring, Fall.

Inquiries: Prof. S. Scott, Math and Statistics.

APPLIED COMPUTING IN AGRICULTURE: Introduction to computing with special emphasis on the use of software packages available on microcomputers. Students will be required to learn BASIC and do assignments. 27.010; Credit; Associate Diploma; 13 Weeks; Spring, Fall.

Inquiries: Prof. A. Dyer, Computing and Information Services.

INTRODUCTION TO COMPUTING IN AGRICULTURE: An introduction to computers with emphasis in agricultural applications. History and elements of computer science and information processing; advantages and limitation of microcomputers and application packages will be covered. 27.120; Credit; Undergraduate; 13 Weeks; Fall.

Inquiries: G.A.B. Moore, Raithby House.

TECHNOLOGY IN EXTENSION EDUCATION: An examination of the issues involved in using media in formal and non-formal teaching situations. The comparative characteristics will be examined. The system approach to the adoption of teaching strategy will be emphasized. 38.308; Credit; Undergraduate; 13 Weeks; Winter.

UNIVERSITY OF MANITOBA

Inquiries: Dr. L. Sandals, Faculty of Education.

COMPUTER APPLICATION TO EDUCATION: Computers will be considered in the educational context as subjects of instruction, tools of instruction, research and development tools and management tools. 43.306; 3 Credits; Undergraduate/Graduate; Summer.

COMPUTER APPLICATION TO EDUCATION: An advanced course dealing with tutorial application of computers in both regular and special education classrooms. 43.526; 3 Credits; Graduate; Spring, Summer.

Inquiries: Dr. Denis Hlynka, Faculty of Education, University of Manitoba, Winnipeg, Manitoba R3T 2N2.

RECENT DEVELOPMENTS IN CURRICULUM: NEW INFORMATION TECHNOLOGIES: Theoretic study of new information media and environments. Technologies examined include video, tape, videodisc, videotex, satellite, microcomputers, and distance education technologies. 81.530; 3 Credits; Graduate; 12 Weeks; Fall.

ADVANCED COMPUTER APPLICATION IN

EDUCATIONAL PSYCHOLOGY: This course will deal with the use of recent innovations in computer-assisted learning technology and will be set up to take into account the needs of the graduate level student in the Faculty of Education. 43.716; 3 Credits; Graduate; Spring, Fall, Summer.

Inquiries: Dr. Harvey Williams, Faculty of Education.

MICROCOMPUTERS IN MATH AND SCIENCE: An introduction to the computer and programming for school mathematics and science; instructional methodology problem-solving, tutorial, and simulation modes of computer use in the classroom. 81.528; 6 Credits; Graduate; Spring, Fall, Summer.

Inquiries: Dr. Dennis King, Faculty of Education.

COMPUTER APPLICATIONS TO SOCIAL STUDIES AND GEOGRAPHY: 63.5XX; 3 Credits; Graduate; 12 Weeks; Spring, Fall, Summer.

MCGILL UNIVERSITY

Inquiries: Peter G. Burpee, Director, Certificate in Educational Technology, Faculty of Education, McGill University, 3700 McTavish St., Montreal, Quebec H3A 1Y2.

INTRODUCTION TO LOGO AND EDUCATIONAL COMPUTING: The microcomputer and its learning applications with children. Special attention is given to LOGO graphics, the development of lessons with an authorizing language and the use of the microcomputer for remedial work in subjects such as reading and mathematics. 432-240; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

MICROCOMPUTERS APPLICATIONS IN THE EDUCATIONAL ENVIRONMENT: Types of instructional programs and their place in learning; teaching and managing school/CEGEP computer science subject-based application, including remedial programs, teaching gifted children and children with learning disabilities; authoring languages; general applications such as word processing, record-keeping and test item banks; information systems and data banks. 432-344; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

LOGO AND THE LEARNING PROCESS: A study of LOGO as a discovery computer language, its special contribution to the learning process, and its other educational applications. 432-311; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

MICROCOMPUTERS IN EDUCATION: BASIC II: Continuation of BASIC programming; 2–D arrays, string manipulations, subroutines, using DOS, graphics, top-down design, programming strategies, authoring languages; developing CAL exercises. Emphasis on programming for instructional purposes. 432-342; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

INSTRUCTIONAL PROGRAMMING IN PASCAL: Overview of programming languages; design features of Pascal; operating systems and editors; control statements; data structure (arrays, records, sets, files); Pascal in the school curriculum. 432-244; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

AUTHORING LANGUAGES: Microcomputer authoring languages, their characteristics, limitations and application. Lesson and test design, flow charting, use of graphics, sound, and data files; development, trials and revision of computer lessons prepared during the course. 432-346; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

MICROCOMPUTER APPLICATIONS IN SECONDARY EDUCATION: The use of microcomputers in a selected area of secondary school teaching; examination and evaluation of software; development of programs for classroom use; and analysis of future implications for the curriculum. 425-391; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

INSTRUCTIONAL SOFTWARE DESIGN AND EVALUATION: The theory and design of computer-assisted learning modules; including determining specific learner needs and objectives, lesson flowcharting, lesson modes and design, feedback, evaluation and revision, teaching and managing microcomputer-based lessons. 432-348; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

INDEPENDENT PROJECT: A major educational computing project (eg. development of educational software/documentation) undertaken by the student after consultation with the Direction of the Educational Technology program. 432-405; 6 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

MICROCOMPUTER GRAPHICS AND ANIMATION: A study of programming techniques for graphics and animation as applied to the development of educational software. Included are graphing, tokens/shape tables, utility programs, animation and sound. 432-442; 3 Credits; Undergraduate; 12 Weeks; Spring, Fall, Summer.

UNIVERSITY OF NEW BRUNSWICK (A)

Inquiries: Prof. R. Bourque, Faculty of Education, University of New Brunswick, Fredericton, New Brunswick E3B 6E3.

MICROCOMPUTERS IN THE BUSINESS EDUCATION CLASSROOM: Provides the secondary school teacher with hands-on experience in the use of the microcomputer for the teaching of word processing, data processing and accounting as well as the use of current business software. EDVO 3887; Credit; Undergraduate; 12 Weeks; Fall, Spring.

UNIVERSITY OF NEW BRUNSWICK (B)

Inquiries: Dr. M. Small, Chairman, Division of Curriculum and Instruction, Faculty of Education, University of New Brunswick, Fredericton, New Brunswick E3B 6E3.

USING COMPUTERS IN TEACHING THE ACADEMIC SUBJECTS: Using computers in traditional elementary and secondary school academic subjects; emphasis on subjects will depend on student interest. EDCI 4426; Credit; Undergraduate; 13 Weeks; Spring, Fall, Summer.

NOVA SCOTIA AGRICULTURAL COLLEGE

Inquiries: S. G. Smith, Department of Mathematics and Physics, Nova Scotia Agricultural College, P.O. Box 55, Truro, Nov Scotia B2N 5E3.

COMPUTATIONAL METHODS: Microcomputer use in the decision-making and management. Agricultural applications are stressed. The basics of programming are stressed through laboratory exercises. MP 14; 2-year Agricultural Technician Program; 13 Weeks; Spring.

NOVA SCOTIA TEACHERS' COLLEGE

Inquiries: Dr. D. L. Burt, P.O. Box 810, Nova Scotia Teachers' College, Truro, Nova Scotia B2N 5G5.

COMPUTERS IN EDUCATION: The primary emphasis of this course will be on developing the skills and concepts necessary for the classroom teacher to incorporate computer-assisted learning into his/her program of instruction. CIN 323; 3 Credit Hours; Undergraduate; 12 Weeks; Spring/Fall, 3 Weeks Summer.

EVALUATION AND DESIGN OF COMPUTER SOFTWARE FOR THE CLASSROOM: This course is intended to provide teachers with the fundamental knowledge and practice needed to decide when to adopt prepared software, modify existing software, and create software to meet the need to learners. CIN 333; Credit; Undergraduate; 13 Weeks Spring/Fall, 3 Weeks Summer.

COMPUTER LITERACY: A course designed to serve teachers by establishing basic skills and providing background knowledge to establish a basic level of computer literacy. COM 203; Credit; Undergraduate; 13 Weeks Spring/Fall, 3 Weeks Summer.

UNIVERSITY OF OTTAWA

Inquiries: The Dean, Faculty of Education, University of Ottawa, 651 Cumberland, Ottawa, Ontario K1N 6N5.

ORDINATEURS EN EDUCATION: Historique des ordinateurs depuis leur début; générations actuelles et futures d'ordinateurs; impact sur l'apprentissage en milieu scolaire; matériel, logiciel et didacticiel; terminologie de l'ordinatique. PED 1794; 3 Credits; Undergraduate; Spring, Fall, Summer.

APPLICATION DES ORDINATEURS EN EDUCATION: Utilisation des ordinateurs en éducation; impact sociologique; puissance et limite des ordinateurs; dépendance de l'intelligence humaine; étude de logiciel et de didacticiel; mises en situation. PED 1894; 6 Credits; Undergraduate; Spring, Fall, Summer.

PRINCIPES DE DESIGN DE LOGICIELS: Bases psychopédagogiques du design de logiciels et de didacticiels; évaluation de logiciels et de didacticiels. PED 2794; 3 Credits; Undergraduate; Spring, Fall, Summer.

APPLICATION DES THEORIES D'ENSEIGNMENT ASSISTE PAR ORDINATEURS: Mise en application des théories psychopédagogiques de l'apprentissage par ordinateurs (e.g. "C.A.I.", "C.M.I.", "C.M.L.", etc.); évaluation de certains systèmes; mises en situation. PED 2894; 6 Credits; Undergraduate; Spring, Fall, Summer.

RECHERCHES ET TENDANCES ACTUELLES DEL'ORDINATIQUE EN EDUCATION: Etude des différents courants de pensée en ordinatique; tendances locales, provinciales et nationales. PED 3794; 3 Credits; Undergraduate; Spring, Fall, Summer.

PLANIFICATION ET SUPERVISION DE PROGRAMMES INTEGRANT L'ORDINATEUR: Role du coordonnateur, du supérieur, du spécialiste et du consultant; aspects administratifs; utilisation d'un langage d'auteur; ressources; mises en situation. PED 3894; 6 Credits; Undergraduate; Spring, Fall, Summer.

INFORMATIQUE AU CYCLE INTERMEDIARE: Ce cours vise a initier l'enseignant a l'enseignement de l'informatique au cycle intermédiaire selon les stades de développement de l'élève. Carrières en informatique. Câdre théorique de l'apprentissage de l'informatique, implications pédagogiques. PED 1755; 3 Credits; Undergraduate; Spring, Fall, Summer.

INFORMATIQUE AU CYCLE SUPERIEUR: Ce cours vise à familiariser l'enseignant avec les principes et procédés d'enseignement dans les matières connexes à l'informatique. PED 1756; 3 Credits; Undergraduate; Spring, Fall, Summer.

THE LEARNER AND THE COMPUTER: A brief history of computer within the learning environment; an examination of the elements in computer assisted learning; knowledge and skills necessary to assist and instruct the learner in the use of computers. PED 1390; 3 Credits; Undergraduate; Spring, Fall, Summer.

APPLICATION OF THE COMPUTERS IN THE CLASSROOM:
An examination and use of hardware and software as applied to the classroom; classroom utilization of computers; software documentation; software evaluation; the role of the computer in supporting the classroom programmes; design and organization to meet user needs; hands-on experience. PED 1490; 6 Credits; Undergraduate; Spring, Fall, Summer.

THE ROLE OF COMPUTERS IN THE TEACHING-LEARNING PROCESS: The computer in the teaching-learning process; potential and limitations; characteristics of computers and implications in the instructional process; information technology and its impact. PED 2390; 3 Credits; Undergraduate; Spring, Fall, Summer.

THE COMPUTER AND THE CURRICULUM: An examination of the ways in which computers can assist discipline areas and learner exceptionalities; computer-based instruction (e.g. C.A.I., C.M.I., C.M.L. etc.); development of software to suit needs of the learner; use of computers for information retrieval; hands-on experience. PED 2490; 6 Credits; Undergraduate; Spring, Fall, Summer.

SUPERVISION AND MANAGEMENT OF COMPUTER-BASED EDUCATION: An appraisal of the role of the administrator and consultant in a computer-based learning programme; leadership styles; basic principles of administration as applied to in-service programmes; development of an effective in-service programme for teachers; techniques for evaluation of programmes. PED 3390; 3 Credits; Undergraduate; Spring, Fall, Summer.

COMPUTERS IN THE SCHOOL SYSTEM: A comparative study of current issues and implications of computer-based learning across the grades in a school system; comparison of different computer utilization programmes; exploration of an authoring language; resources for computer assisted learning; hands-on experience. PED 3490; 6 Credits; Undergraduate; Spring, Fall, Summer.

ORDINATIQUE AU CYCLE INTERMEDIAIRE:
Ce cours de didactique vise à initier l'étudiant-maître à l'enseignement de la discipline au cycle intermédiare selon les stades de croissance et de développement de l'élève. Contribution de la matière à ce stade de développement, câdre théorique de l'apprentissage de cette discipline et implications pédagogiques; étude critique et interpretation des exigences des programmes-câdres. PED 3727; 3 Credits; Undergraduate; Spring, Fall, Summer.

ORDINATIQUE AU CYCLE SUPERIEUR: Ce cours de didactique vise a initier l'étudiant-maître à l'enseignement de la discipline au cycle supérieur selon les stades de croissance et de développement de l'élève. Contribution de la matière à ce stade de développement, câdre théorique de l'apprentissage de cette discipline et implications pedagogiques; étude critique et interprétation des exigences des programmes-câdres. PED 3727; 3 Credits; Undergraduate; Spring, Fall, Summer.

TEACHING COMPUTER SCIENCE AT THE INTERMEDIATE DIVISION: Introduction to the teaching of the discipline at the intermediate division. Impact of the discipline on the whole learner; individualizing instruction; theoretical framework and pedagogical implications; critical examination and interpretation of relevant curriculum guidelines. PED 3174; 3 Credits; Undergraduate; Spring, Fall, Summer.

TEACHING COMPUTER SCIENCE AT THE SENIOR DIVISION: Introduction to the teaching of the discipline at the senior division. Impact of the discipline on the whole learner; individualizing instruction; theoretical framework and pedigogical implications; critical examination and interpretation of relevant curriculum guidelines. PED 4174; 3 Credits; Undergraduate; Spring, Fall, Summer.

APPRENTISSAGE ASSISTE PAR ORDINATEUR: Modèles de conceptualisation, d'implémentation et d'évaluation en apprentissage assisté par ordinateur. Stratégies et techniques de conceptualisation, de rédaction et d'édition de didacticiel sur les micro-ordinateurs à l'aide d'un langage d'auteur. EDU 5597; 3 Credits; Graduate; Spring, Fall, Summer.

LOGO ET APPRENTISSSAGE: Modèles de curriculum axés sur le LOGO. Stratégies d'enseignement. Contribution de la recherche à la conceptualisation et à la réalisation de modules d'enseignement. Intégration du langage LOGO dans les paradigmes d'apprentissage. EDU 6597; 3 Credits; Graduate; Spring, Fall, Summer.

LA SIMULATION EDUCATIONNELLE: Conceptualisation, opérationalisation, implémentation et évaluation de simulations éducationelles sur micro-ordinateur. Intégration des simulations éducationnelles dans diverses stratégies d'enseignement. Interaction entre simulations, styles et stratégies d'apprentissage. EDU 7597; 3 Credits; Graduate; Spring, Fall, Summer.

COMPUTER-AIDED LEARNING: Design, implementation, and evaluation models in Computer-Aided Learning (CAL). Procedures for creating and editing courseware. Strategies and techniques in courseware authoring on micro-computers. EDU 5197; 3 Credits; Graduate; Spring, Fall, Summer.

LEARNING WITH LOGO: Alternative models of curriculum based on LOGO. Alternative strategies of instruction. Contribution of research to the design and development of instructional systems. Integration of LOGO into learning paradigms. EDU 6197; 3 Credits; Graduate; Spring, Fall, Summer.

EDUCATIONAL SIMULATION: Design, operationalization, implementation and evaluation of model for educational simulation on micro-computers. Integration of educational simulations into alternative strategies of instruction. Interaction between simulations, learning styles and learning strategies.

QUEEN'S UNIVERSITY (A)

Inquiries: Dr. Hugh Munby, Director of Graduate Studies, Faculty of Education, Duncan McArthur Hall, Queen's University, Kingston, Ontario K7L 3N6.

COMPUTERS IN EDUCATION: An introductory, laboratory-oriented course reviewing recent developments in hardware and software. Topics include introductory programming (for instruction) and reviews of computer-based curriculum materials. EDUC 885; Credit; Graduate; 5 Weeks Summer; 12 Weeks Fall, Winter.

COMPUTER-BASED SIMULATION: An introduction to generic modelling concerns with a systems-dynamic feedback approach, and a review of instructional packages on simulation. Production of computer-based models for classroom use. EDUC 886; Credit; Graduate; 5 Weeks Summer; 12 Weeks Fall, Winter.

CREATIVE USES OF MICRO-COMPUTERS: Development in microcomputer software having strong potential for open ended learner exploration. Logo (mathematics and computing science), word-processing (creative writing), "paint" packages (graphic composition), and music editors (composition). EDUC 887; Credit; Graduate; 5 Weeks Summer; 12 Weeks Fall, Winter.

QUEEN'S UNIVERSITY (B)

Inquiries: Mr. Peter Baxter, Department of Film Studies, Queen's University, Kingston, Ontario K7L 3N6.

CULTURE AND TECHNOLOGY: Analyse relation of technology to culture generally with special emphasis on new information technologies. FILM 335; Credit; Undergraduate; 12 Weeks; Fall.

UNIVERSITE SAINTE-ANNE

Inquiries: Charles Gaudet, Director, Ecole professionnelle et de metiers, Universite Sainte-Anne, Church Point, Nova Scotia B0W 1M0.

NOUVELLES TECHNOLOGIES EN EDUCATION: PED 2133; 3 Credits; Undergraduate; 15 Weeks; Spring.

UNIVERSITY OF SASKATCHEWAN

Inquiries: Dr. F. B. Brown, Head, Department of Communications, Continuing and Vocational Education, College of Education, University of Saskatchewan, Saskatchewan, Saskatoon, Saskatchewan S7N 0W0.

INTRODUCTION TO COMPUTERS IN EDUCATON: Overview of the role of computers in society and in education — both present and future. Introducing facility with BASIC will be developed through the use of program modification and simple programming techniques. Current levels in hardware and software development will be discussed. CMPED 218.3; 3 Credits; Undergraduate; 14 Weeks; Spring, Fall, Summer.

APPLYING COMPUTATIONAL TECHNOLOGY IN EDUCATION: Advanced control structures (various loops, subprocedures, etc.), advanced data structures (strings, arrays, files, etc.), and various applications will be presented. CMPED 418.3; 3 Credits; Undergraduate; 14 Weeks; Spring, Fall, Summer.

METHODS OF TEACHING COMPUTER SCIENCE IN THE SECONDARY SCHOOL: This course will prepare secondary teachers to teach computer science in the secondary schools of the province. Topics will include an examination of current curricula, methodologies, and hardware currently used in the schools. The development of problem solving skills needed for success in computer programming will be included. EDCUR 319.3; 3 Credits; Undergraduate; 14 Weeks; Spring, Fall, Summer.

A SURVEY OF MICROCOMPUTER APPLICATIONS IN EDUCATIONAL ENVIRONMENTS: This course will present a variety of applications of existing software for information manipulation and management for classroom teachers and administrators. Topics will include hardware requirements, text management, telecommunications, data base management, simulation and model building, and graphics. EDCCV XX.3; 3 Credits; Undergraduate; 14 Weeks; Spring, Fall, Summer.

UNIVERSITE DE SHERBROOKE

Inquiries: Guy Stringer, Secretaire, Faculte d'Education, Universite de Sherbrook, Sherbrook, Quebec J1K 2R1.

INFORMATIQUE L'ORDINATEUR ET L'ENSEIGNEMENT: Ce cours a pour but, non pas de former des spécialistes de l'informatique, mais de permettre à des éducateurs de décider s'ils utiliseront ou non l'ordinateur comme instrument pédagogiqué. DCS 503; 3 Credits; Undergraduate; 15 Weeks; Spring, Fall .

ELEMENTS DE LOGICIEL: A la suite de ce cours, l'étudiant devraît maitriser les principales techniques et outils de programmation (programmation structurée, ordinagramme, boucles, tableaux, fichiers, graphisme, couleur et son) et avoir conçu et réalisé un ligiciel (ou didacticiel) qui répond à un besoin dans son milieu de travail. Il s'agit donc d'un cours/atelier qui se déroulera principalement au laboratoire de micro-informatique. TEC 102; 3 Credits; Undergraduate; 15 Weeks; Fall.

DIDAXOLOGIE A LA SCIENCE DE L'INFORMATIQUE AU SECONDAIRE: Ce cours vise a habiliter l'etudiant-maître face à l'enseignement du programme d'introduction a la Science de l'informatique (ISI). Aperçu des théories cognitives sous-jacentes à l'utilisationl'ordinateur a l'école et conception de l'activite de programmation comme génératrice d'habiletés de résolution de probleme. TEC 106; 3 Credits; Undergraduate; 15 Weeks; Winter

SYSTEMES D'INFORMATION: Ce cours vise à faire acquérir les connaissances et habiletés relatives aux principaux aspects de l'informatique en milieu scolaire: la pédagogie, la gestion, la quincaillerie et la programmation — connaissances et habiletés jugées utiles a ceux qui ont la responsabilité d'administrer cette ressource. SIG 800; 3 Credits; Graduate; 15 Weeks; Winter

ORDINATEUR COMME OUTIL DIDACTIQUE AU PRIMAIRE: Familiarisation avec l'ordinateur à travers de situations d'apprentissage utilisant le langage LOGO. Construction d'algorithmes de programmation. Heuristiques de résolutions de problèmes par le langage dans une pédagogie cognitive. ORP 300; 3 Credits; Undergraduate; 15 Weeks; Fall, Winter

INFORMATIQUE ET DIDACTIQUE DE MATIERES: Etude de thèmes choisis dans le contexte de l'apprentissage et de l'enseignement par les moyens de l'informatique; exemples: enseignement assisté par l'ordinateur; étude, classification et critique de logiciels (didacticiels); apprentissage et langage de programmation; résolution de problemes à l'aide de l'ordinateur, réalisation de situations d'apprentissage à l'aide de ou sur l'ordinateur; etc. DPR 701; 3 Credits; Graduate; 15 Weeks; Winter.

INSTRUMENTATION PEDAGOGIQUE: S'appuyant sur les théories et les pratiques appartenant au domaine de la technologie de l'éducation, ce cours étudie les composantes impliquées dans la création et l'utilisation de produits éducatifs. C'est ainsi que seront mis en relation, d'une part, des apprentissages visés et, d'autre part, les techniques pour les réaliser. PED 403; 3 Credits; Undergraduate; 15 Weeks; Fall, Winter.

MICROPROCESSEURS I: Ce premier cours sur les microprocesseurs suppose une culture élémentaire en électronique des circuits integres, des circuits numériques et en mathematiques. Ce cours a pour intention de donner des connaissances de base et pratiques à ceux qui oeuvrent dans différents champs technologiques, afin d'entrer dans le domaine de la maintenance des produits et systèmes utilisant les microprocesseurs. PPS 525; 3 Credits; Undergraduate; 15 Weeks; Fall,.

MICROPROCESSEURS II: Il a pour intention de donner des connaissances et des pratiques à ceux qui oeuvrent dans différents champs technologiques, afin d'entrer dans le domaine de la maintenance des produits et systèmes utilisant les microprocesseurs. En particulier, les activités d'apprentissage seront faites en utilisant le microprocesseur 6800 de Motorola, en insistant sur l'interface parallele ou P/A pour réaliser un systeme de controle numérique simple. PPS 526; 3 Credits; Undergraduate; 15 Weeks; Winter.

SIMON FRASER UNIVERSITY

Inquiries: Dr. A. J. Dawson, Faculty of Education, Simon Fraser University, Burnaby, B.C. V5A 1S6.

COMPUTER-BASED LEARNING: Examines the role of computers in education with an emphasis on computer-based learning using microcomputers. EDUC 851; Credit; Graduate; 6 Weeks; Summer.

COMPUTERS IN EDUCATION: EDUC 486; Credit; Undergraduate; 13 Weeks, Spring, Fall, Summer.

EDUCATIONAL USES OF COMPUTERS: The course will be concerned with aspects of the teaching of computer related topics and applications of computers at elementary and secondary school level. CMPT 362-4; Credit; Undergraduate; 13 Weeks; Summer.

MICROWORLDS AND THE WORLD OF LOGO: The course is designed for prospective and practising teachers who have had some experience with microcomputers. The course will function as a professional seminar. Each participant is expected to contribute to the education by means of discussions, presentations, sharing of experiences, reading, study, reflection, experimentation, etc.; EDUC 807; Undergraduate/Graduate.

UNIVERSITY OF WESTERN ONTARIO

Inquiries: Prof. John E. Wash, Business & Computer Studies Department, Faculty of Education, University of Western Ontario, London, Ontario N6G 1G7.

DATA PROCESSING: This course is designed to prepare teachers for the intermediate and senior divisions to teach data processing courses outlined in the Ontario Ministry of Education guideline, Computer Studies. The major emphasis of the course is on the methodology for the intermediate division course called Introduction to Computer Studies. BC E31; Pre-Service Credit; Post-Graduate; 120 Hours; Fall, Winter.

DATA PROCESSING, PART I: This course is to prepare teachers for the intermediate division to teach the Introduction to Computer Studies course as outlined in the Ontario Ministry of Education guideline, Computer Studies. The topics in the course include programming; computer applications, past-present-and future; structure of the computer; and careers in the computer field. This course examines both the topics and methodology for the advanced, general and basic level students. BC E31; In-Service Credit; Post-Graduate; 120 Hours; Summer.

DATA PROCESSING, PART II: This course is to prepare teachers for the senior division to teach data processing courses as outlined in the Ontario Ministry of Education guideline, Computer Studies. These courses include Data Processing Concepts, Data Processing Applications, Data Processing Techniques, and Data Processing Systems Analysis & Design. The course examines the content and methodology for each of the courses listed. BC E35; In-Service Credit; Post-Graduate; 120 Hours; Summer.

DATA PROCESSING, SPECIALIST: The specialist course examines and reviews all the Data Processing courses listed in the Ontario Ministry of Education guideline, Computer Studies. This course not only reviews the methodology and content for teaching the Data Processing course, but also examines other Ministry of Education guidelines which complement the Computer Studies guidelines. The course also examines the duties and functions of a Business Education co-ordinator, considerations in selecting equipment and budgeting. BC E41; In-Service Credit; Post-Graduate; 120 Hours, Summer.

COMPUTERS IN THE CLASSROOM, PART I: This course is the first session of a three-part course dealing with the computers as they may be used across the curriculum for both the elementary and secondary school programs. Topics include the structure and function of computers, how to communicate with computers, evaluation of software, course are, and lessonwre. Introduction of the LOGO language and the developments of storyboards for Computer Asisted Instruction. BC E20; In-Service Credit; Post-Graduate; 120 Hours; Summer.

COMPUTERS IN THE CLASSROOM, PART II: Topics for this course include the use of pre-written software such as word processing, spreadsheets, and data-based management programs, the impact of the computer in society and particularly in education, more in-depth study of LOGO-like language, storyboarding and evaluating exemplary software. BC E21; In-Service Credit; Post-Graduate; 120 Hours; Summer.

COMPUTERS IN THE CLASSROOM, SPECIALIST: The topics include integrating computers into the curriculum, uses of software and hardware in various curricula especially for execptional children, the duties and responsibilities of a computer co-ordinator, examination and evaluation of computer hardware and software. BC E22; In-Service Credit; Post-Gradute; 120 Hours, Summer.

COMPUTERS IN EDUCATION: Topics include a brief description of the structure of computers, methods of communicating with the computer (elementary programming), examples of pre-written software such as word processing and visicalc, methods of evaluating pre-written software, and a brief discussion of the impact of the computer on education. BC E61a/b; Pre-Service Credit; Post-Graduate; 120 Hours; Fall, Winter.

COMPUTER SCIENCE: This course is to prepare teachers for the intermediate and senior divisions to teach Computer Science course as outlined in the Ontario Ministry of Education guideline, Computer Studies. The major emphasis of the course is on the methodology for the intermediate division course called Introduction to Computer Studies. Time is also devoted to examining the methodology of teaching the advanced level senior division courses of Computer Science & Technology. BC E38, Section A; Pre-Service Credit; Post-Graduate; 120 Hours; Fall, Winter.

UNIVERSITY OF WINNIPEG

Inquiries: Ms. Pat Benell, Program Officer, University of Winnipeg, 515 Portage Avenue, Winnipeg, Manitoba R3B 2E9.

USING MICROCOMPUTERS IN EDUCATIONAL ADMINISTRATION: This course has been developed especially for Manitoba School principals, superintendents, and other school administrators. The three main areas to be covered are: Records Keeping, deals with saving time and space, while at the same time improving efficiency and accuracy; Word Processing; Educational Programming, specific information will be provided to help you understand the different uses to which software may be put. SYS 009; Non-Credit; Spring, Fall, Winter.

USING MICROCOMPUTERS IN THE CLASSROOM — INTRODUCTORY: This course is designed for teachers who have little or no experience with microcomputers. It will feature a hands-on approach and will cover such topics as: operation of microcomputers, use of microcomputers in the classroom, BASIC programming, sources of courseware, design of computer literacy programs, design of computer assisted learning materials. SYS 010; Non-Credit; 4 Weeks, Spring, Fall, Winter.

USING MICROCOMPUTERS IN THE CLASSROOM — ADVANCED: For teachers who have some experience with microcomputers, this course will be oriented toward classroom use of microcomputers. Topics will include: design and implementation of computer literacy courses, computer graphics using a motivational approach to teaching programming, integration of computer assisted instructional packages into the curriculum, a review of educational software materials, introduction to LOGO. SYS 026; Non-Credit; 4 Weeks; Spring, Fall, Winter.

INTRODUCTION TO LOGO PROGRAMMING: This introductory course in LOGO programming is designed to give the student basic literacy in LOGO. The course will also examine, the type of uses to which LOGO may be put in the classroom. Hands-on programming will be emphasized. SYS 018; Non-Credit; 1 Week; Spring, Fall, Winter.

LOGO PROGRAMMING AND CURRICULUM DESIGN: This course examines the relationship between LOGO programming in classroom settings and the stimulation of cognitive development. In addition, some background in major theories of cognitive development will be presented. Rudimentary literacy in LOGO is assumed. SYS 019; Non-Credit; 2 Weeks; Spring, Fall, Winter.

LOGO PRGRAMMING AND CURRICULUM DESIGN FOR THE SPECIAL NEEDS CHILD: A significant characteristic of LOGO is its potential for generating growth in cognitive skills. For special needs children, work with LOGO does not involve tedious and exhausting rehearsal of material which the child is cognitively unable to assimilate but for the growth of cognitive structures which will permit assimilation of a variety of material. A section of the course will focus on the usefulness of LOGO for attentionally underfocused (impulsive) children. SYS 035; Non-Credit; 1 Week; Spring, Fall, Winter.

ARTIFICIAL INTELLIGENCE AND THE FIFTH GENERATION: Current developments in Artificial Intelligence will be discussed through a series of two-hour lectures. This course will introduce you to the new generation of logic based machines. Included will be: decision algorithms, problem solving strategies, language processing capabilities. SYS 038; Non-Credit; 4 Weeks; Spring, Fall, Winter.

INTRODUCTION TO BASIC PROGRAMMING: This course is designed to provide those who have little or no computer experience or training with a working knowledge of the BASIC programming language. The student will gain an understanding of computers and will receive hands on supervised training, programming in the BASIC language. Topics will include: What is a computer? What is BASIC? Why use BASIC? design and elements of the language, example programs. SYS 005; Non-Credit; 5 Weeks; Spring, Fall, Winter.

INTERMEDIATE BASIC PROGRAMMING: This course is designed to provide a person who has had some introductory BASIC programming training or experience with additional tools to use. Topics to be discussed will include: review of introductory BASIC, subroutines and sub-programs; arrays, text handling, random numbers, output formatting, exercises in programming, hands on BASIC programming experience. SYS 023; Non-Credit; 5 Weeks; Spring, Fall, Winter.

ADVANCED BASIC PROGRAMMING: This course is designed to help you use the BASIC programming language in the solution of problems utilizing the microcomputers. Topics will include: brief review of BASIC language, random and sequential file handling techniques, input/output operations, sorting techniques, documentation requirements and techniques, specialized applications, different dialect of the language. SYS 006; Non-Credit; 5 Weeks; Spring, Fall, Winter.

INTRODUCTION TO COMPUTER: This course is designed to give the student an understanding of how computers work in a business environment. A brief introduction to BASIC programming language will be part of this course. The lecture material will be reinforced by access to a computer via terminals. SYS 001; Non-Credit; 1 Week; Spring, Fall, Winter.

INTRODUCTION TO MICROCOMPUTERS: This course is designed to provide persons with little or no computer experience or training with an introduction to microcomputers. The student will receive a broad overview of microcomputers and will gain an understanding of some of the techniques available for using these devices in their day to day life and work. SYS 002; Non-Credit; 1 Week; Spring, Fall, Winter.

MICROCOMPUTERS: THEIR PERIPHERAL DEVICES: In this course you will learn how video displays, keyboards, printer, tape and disk drives work. Prerequisites — MICROCOMPUTERS: UNDERSTANDING HOW THEY WORK and MICROCOMPUTERS: THE HARDWARE CONCEPTS: SYS 034; Non-Credit; 8 Week; Spring, Fall, Winter.

MICROCOMPUTERS: THE HARDWARE CONCEPTS: In this course, the second of the series, you will examine a typical microcomputer in detail. Knowledge gained in MICROCOMPUTERS: UNDERSTANDING HOW THEY WORK will be built upon. Topics to be discussed are: microprocessor chip, instruction set, programming techniques, communications via parallel and serial ports, operation of the complete system. SYS 027; Non-Credit; 8 Week; Spring, Fall, Winter.

MACHINE LANGUAGE PROGRAMMING: 6502 MICROPROCESSOR: This course is designed (1) to give you an understanding of the structure of the 6502 microprocessor, (2) to learn and use the machine language it supports, and (3) to take advantage of some of the existing machine language subroutines. Instructor lectures and demonstrations will be done using a microcomputer and students will have access to microcomputers, during class time to assist in the learning process. SYS 013; Non-Credit; 10 Weeks; Spring, Fall, Winter.

MICROCOMPUTERS: INTERFACING METHODS: This course shows how the microcomputer communicates with the electrical and mechanical devices. Prerequisites — MICROCOMPUTERS: UNDERSTANDING HOW THEY WORK and MICROCOMPUTERS: THE HARDWARE CONCEPTS. SYS 033; Non-Credit; 8 Week; Spring, Fall, Winter.

DEMYSTIFYING THE COMPUTER: Changing technology in the home, school and workplace has brought about a need for the demystification of an increased accessibility to microcomputers for women who have not as yet been exposed to them. This course will answer many questions as to their use and impact of the family, as well as providing hands-on experience with the machines. SYS 032; Non-Credit; 4 Week; Spring, Fall, Winter.

PORTFOLIO MANAGEMENT AND FUNDAMENTAL SECURITY ANALYSIS: This course is designed to enhance the decision-making process as to security selection through fundamental analysis. In it you will develop information management techniques that will complement traditional methods of security analysis. New methods for maintaining and evaluating securities portfolios will be included. SYS 031; Non-Credit; 5 Week; Spring, Fall, Winter.

SELECTING MICROCOMPUTERS FOR BUSINESS: This course has been developed especially for business people with little or no computer experience. Learn how to put your priorities into perspective before selecting a microcomputer. Emphasis is placed on assessment of needs and justification for the purchase of a system. SYS 022; Non-Credit; 6 Week; Spring, Fall, Winter.

INTRODUCTION TO USING MICROCOMPUTERS IN STOCK MARKET ANALYSIS: This course will review the fundamentals of stock market analysis and will introduce some associated computer applications. You will benefit from this course if you have minimal experience from both these fields and are interested in exploring the potential of the computer at an introductory level, in stock market analysis. SYS 028; Non-Credit; 5 Week; Spring, Fall, Winter.

DATA COMMUNICATION USING MICROCOMPUTERS: This course will be of interest to those who wish to develop an understanding of the principles of data communication and who want to learn the "Whys and Hows" of implementing it in their particular environment. The course is also appropriate for those who work with minicomputers, larger business computers and word processing systems, since the basic principles are the same for all systems. SYS 011; Non-Credit; 4 Week; Spring, Fall, Winter.

YOU AND YOUR VIC 20: This course is designed to aid the beginning programmer. The course will concentrate on the use of the Commodore VIC-20 microcomputer. The computer and its peripherals will be discussed as well as the BASIC language, programming applications (including animation) and program design. SYS 025; Non-Credit; 4 Week; Spring, Fall, Winter.

COMPUTER APPLICATIONS IN STOCK MARKET TIMING AND TECHNICAL ANALYSIS: You will be shown how to create and maintain security time series data files for investment analysis; how to increase the number of securities that can be systematically followed and analyzed; and how to enhance the investment decision making process through technical analysis. SYS 029; Non-Credit; 8 Week; Spring, Fall, Winter.

WORD PROCESSING FOR SECRETARIAL/CLERICAL/ SUPPORT STAFF: This course will teach you to complete your work faster as well as more efficiently. The time you save may be your own. The practice and suggestions you receive will bring you closer to being a professional Word Processor. Topics to be included: general features of word processors, what hardware features make life easier, software samples and examples, banking formats, file handling, manuals and self-teaching. SYS 014; Non-Credit; 7 Week; Spring, Fall, Winter.

INTRODUCTION TO WORK PROCESSING FOR MANAGERS: The topics to be included in the discussions and hands-on practice are: general features of Word Processors, hardware available, software samples and examples, selection criteria, developing a system, formatting and editing, file handling, sources of information, dialects of the trade, global possibilities.

VISICALC: A TOOL FOR PLANNING AND FORECASTING: This course is designed to introduce you to VisiCalc, the most popular of the many "electronic spreadsheet' programs available for microcomputers. Topics covered are: introduction to microcomputers, principles of an electronic spreadsheet, creating a spreadsheet, use of VisiCalc commands to simplify spreadsheet preparation, entering and revising data interpreting the results. SYS 012; Non-Credit; 3 Week; Spring, Fall, Winter.

AMTEC
Board of Directors 1983-84

President
Dr. Barry Brown
Head, Department of Educational Communications
College of Education
University of Saskatchewan
Saskatoon, Saskatchewan S7N 0W0

Past President
Mr. Tom Rich
Media Co-ordinator
Department of Education
P.O. Box 200
Charlottetown, P.E.I. C1A 7N8

President-Elect
Mr. Bill Hanson
Supervisor of Instructional Materials
Calgary Board of Education
3610 - 9th Street S.E.
Calgary, Alberta T2G 3C5

Secretary/Treasurer
Mr. Ron Eyre
Educational Media Consultant
Wellington County Board of Education
500 Victoria Road
North Guelph, Ontario N1E 6K2

Board Member
Mr. Bruce MacLean
Director of Instructional Media
Vancouver Community College
1155 East Broadway
Box 24700, Station "C"
Vancouver, B.C. V5T 4N4

Board Member
Ms. Danielle Fortosky
Director, Educational Television
University of Saskatchewan
Saskatoon, Saskatchewan S7N 0W0

Board Member
Ms. Judy Benson
Research Officer, Planning Branch
Saskatchewan Continuing Education
1855 Victoria Avenue
Regina, Saskatchewan S4P 3V5

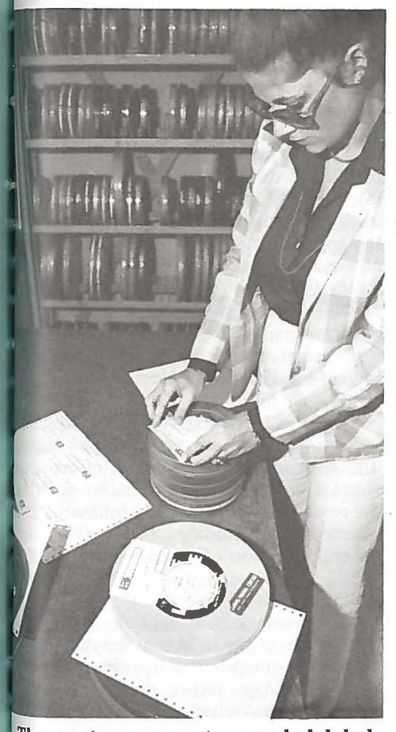
Editor: Canadian Journal of Educational Communication
Dr. Denis Hlynka
Faculty of Education
University of Manitoba
Winnipeg, Manitoba R3T 2N2

ocess

stage agreed to contribute their share of development costs; the program will be available to other ECNO boards in the future for the same amount, with proceeds to help develop enhancements.

The program is an interactive one that allows a clerk to work on-line with a school representative by telephone to reserve curriculum items throughout the school year calendar; this greatly increases the feedback to teaching staff of information needed to facilitate lesson preparation. The system also generates labels and packing slips for the shipping routines as well as providing statistics required to improve library management and plan professional development to identified needs. Incidentally, the potential is there for schools to book resources directly from school level terminals as these become available.

The biggest payoff for me, though, is job enrichment. The manual posting and constant resorting of paper required to expedite some 16,000 circulations a year has to be one of the least rewarding jobs! Now my staff will have a personal contact with someone in each school, and film reservations will be made as a result of human interaction.



The system generates needed labels and packing slips in numerical order by school, greatly facilitating routines of pulling and packing films for shipment.

As the program neared completion, I began an implementation strategy that included necessary approvals as well as the sharing of information with school principals. In May, I met with school liaisons who had been designated by the principal. Procedures were explained, with their input encouraged, regarding necessary phone schedules and the design of the internal local procedures. As a result of this dialogue, I prepared a June notice for all teachers in the system to explain the planned change. This is intended to be the last such notice from me. Information about ordering films will now be relayed through the school liaison to enhance that role; this was intiated with posters and information sheets being supplied to them in quantity for use with staff at the start of term in September.

During the late spring and summer, the program was installed and "gotten-up". Ours was among the first operative, so there was constant communication between our office and both media and computer personnel of the Waterloo County Board. Labels were ordered, an INWATS telephone arranged for to accommondate ordering, and tests were run and analysed. Problems did crop up, but were identified, and corrected.

Ordering procedures started on September 1, 1983. There was some excitement as nervous school liaisons called booking clerks who had been no more than introduced to the newly installed telephone handset and mike! Keeping in the background, I could sense an easing of tension as explanations were made in conversational tones. A great feeling of accomplishment came with the printing of shipping labels and packing slips for the next courier run.

An important part of the process had to be the establishment of film expediting routines. The two staff who share the booking and refurbishing tasks have been heavily involved in decisions in this regard. All of us are committed to an ongoing dialogue about routines and incidental problems, making revisions and adjustments as required. Informal feedback to-date from schools suggests a positive reception by both teachers and liaisons.

The process has been most rewarding and I would recommend such a collective approach when addressing media management problems at any time, but especially when one's own resources seem so limited. The saving of dollars is most obvious but probably the expanding of human resources and ideas, bringing in backgrounds and skills not available within the organization, is the greatest benefit. □

MEDIA NEWS
Continued from page 2

functions be identified and evaluated in commercially-produced packages, and ways in which they could be effectively applied. Included is a list of about 75 packages for converting a microcomputer into a smart terminal. This is a 1983 publication of CLASS, a San Jose (CA) firm. The booklet is also available in the ERIC Documents collection as ED 234 740.

Videotex in Education: current developments in screen design, data structure and access control, by Stephen T. Kerr. Another paper presented to the American Educational Research Association's Montreal meeting, this addresses human design requirements for the development of videotex. Such topics as display design, information storage methods, typography, privacy and educational applications are discussed. The author also summarizes the history of videotex development and the outlook for development in the future. The document is available in the ERIC Document collection as ED 234 739.

The Information Technologies: Telidon and education perspectives and possibilities for a new information technology and its impact on education, by Joan McLaren. Telidon, its technology and what it has to offer education and society, is the topic of this paper. An explanation of Telidon technology is here illuminated by some useful diagrams. The possible relationships between Telidon and other technologies are also discussed. A notable selective bibliography concludes this document, which may be found in the ERIC Document collection as ED 234 770. The paper was prepared in 1983 at the Manitoba Department of Education Instructional Media Services office in Winnipeg.

Dictionary of Library and Educational Technology, by Kenyon C. Rosenberg. This dictionary converts a wide range of terms relating to hardware and software in the audiovisual, microcomputing and electronics fields. More than 800 terms are listed. In addition, a bibliography on educational technology is included, as well as a discussion of criteria used in the selection of equipment for schools and libraries. The dictionary is the 2nd edition of **Media Equipment: a guide and dictionary**, and may be purchased from the publisher, Libraries Unlimited, P.O. Box 263, Littleton, CO 80160.

(Continued on page 15)

Formative Research on Telidon and Educatio

By Avi Soudack
and
Bob Karam

ABSTRACT

TVOntario recently conducted a field trial of Telidon in education, and a formative research study based on the trial has been completed. The field trial involved the deployment of Telidon terminals at public schools, colleges, universities, libraries, and special-educational institutions. The formative research effort was undertaken to gather information on Telidon that could be applied to the development of Telidon in education. The research involved a variety of complementary research methods — including observation, interviews, and survey questionnaires. During the field trial, users tended to explore Telidon, rather than use it as a learning tool. Several factors were identified as influencing how Telidon was implemented at each institution; these included the role of the contact person, and a need for printed documentation. The database was found to contain too few sequences of interest and the search for sequences or information was considered too time consuming. The graphic design and educational level of sequences were found to offer problems. Formative research provided systematic information of this type on a new educational technology.

TVOntario has recently completed a three-year field trial of Canada's videotex system, Telidon, in which educational videotex applications were explored. The field trial included a major formative research effort to gather information that could be applied to the future development of Telidon and other computer-communication technologies in education*

Supported by the Department of Communications, the field trial involved the implementation of Telidon videotex and teletex services for 50 educational institutions across Ontario (Syrett, 1981; Bowers and Cioni, 1982). Telidon terminals were installed at elementary and secondary schools, colleges and universities, public libraries, and special-educational institutions. The Telidon project team engaged TVOntario's Office of Project Research to undertake a formative evaluation of Telidon in education by examining the nature of the educational activity generated by the field trial. This research has recently been completed and reported (Office of Project Research, TVOntario, 1982).

The research team was not involved in the actual running of the field trial. Distribution of equipment and materials, and liaison with the participating educational institutions, were the formidable task of the Telidon project team. The researchers, however, worked parallel with the project team, benefiting from considerable assistance in the administration of the various research methods employed.

At most sites one person became the major contact between TVOntario's Telidon project team and the institution. Most often, this person created a Telidon sequence (a series of Telidon pages) for inclusion in the TVO database. Throughout the field trial the contact people administered the use of the terminal at their institutions, often with the assistance of other interested staff or students.

The Office of Project Research set up a research team whose primary task was to provide systematic feedback on the uses of Telidon in education to TVOntario's Telidon project team and all those involved in the field trial. Since the field trial was exploratory and the research purely formative, the research team attempted to be as unobstrusive as possible, trying not to intervene in the spontaneous experimentation undertaken by the field trial participants.

The introduction of so new and unprecedented a technology as Telidon into the educational system raise many questions and generated numerous hypotheses. At the outset, the research team, in consultation with the project team, specified a number of categories from which research questions should emerge and information could be gathered. These research categories included:

1. Patterns of use: With so many promises and ideas in the air, the first priority of research was a basic record of how Telidon was used during the field trial.

2. Implementation: The manner in which Telidon was put to use at each of the participating institutions was of considerable interest. The research examined the way teachers, students, and librarians adapted Telidon to their own purposes and the degree to which Telidon use was diffused through the institutions.

3. Assessment of Telidon sequences and database: The content of the Telidon educational database produced during the field trial was examined in an attempt to gather information on how best to design videotex content for educational purposes.

The most important aspect of educational materials — their learning impact — was the most elusive to research. However, some preliminary research was undertaken.

4. Perceptions: Future development of Telidon and its processes of diffusion will have to take account of users' responses to the technology. So administrators, teachers, librarians, and students were given opportunities to express their perceptions of the system.

METHODS

The research team collected data from 34 sites. These sites included primary, secondary, and postsecondary schools as well as public libraries and special-educational institutions.

The research effort included a number of complementary research methods: structured telephone interviews with the contact person at each site; observation conducted during on-site visits; personal interviews with staff at the participating institutions; questionnaires administered to approximately 400 secondary and postsecondary school students who used Telidon in their classes; questionnaires for 200 teachers and administrators at the participating institutions; and a controlled study, carried out to examine the learning impact of a Telidon CAI sequence.

FINDINGS

The breadth of the research effort provided a great deal of data under each of the research categories. The following are selected main findings that reflect the general direction of the results.

1 Patterns of Use

1.1 Learning about Telidon

Throughout the field trial the major use of Telidon consisted of learning "about" the technology, rather than "with" or "through" it. Whether in the form of demonstrations or classes about "the new technologies," Telidon itself was often the object of interest.

1.2 Differential Involvement

It became clear during the field trial that a unified definition of Telidon or its mode of application was not possible. On the contrary, the different educational goals of the participating institutions greatly influenced the process of adoption and the patterns of use.

Differential involvement operated at two levels — the institutional and the departmental. At the institutional level, for instance, universities were primarily interested in extensive research on the technology and its social impact. On the other hand, high schools were most often looking for new forms of teaching materials; they were in search of alternatives to stimulate and motivate their students. These different needs placed different demands on the databases available during the field trial.

At the departmental level, within each institution the use of Telidon was determined by the physical location of the Telidon terminal, and the discipline or function of the department that administered the terminal. For example, at the secondary-school level, terminals were sometimes located in classroom or department office. Teachers and students in the different departments looked for different types of sequences: mathematics teachers were often interested in computer-assisted lessons; geography teachers sought sequences that could be used in class as visual aids. The departmental specialization also limited the use of the system by staff and students from other departments at the institution.

1.3 System Players

At schools where students were allowed to use Telidon at their leisure, small groups of students were drawn to "play the system." These students searched for game sequences on the database (of which there were few). However, they also enjoyed the exploration of the database as a game in itself. We called their exploration "system playing" because it was not motivated by any particular information search: rather, they seemed to find enjoyment seeing how the database was organized, without regard to its contents.

2 Implementation

2.1 Role of Contact Person as Facilitator

There was limited spontaneous diffusion of Telidon use within each institution during the period of the field trial. At many sites few teachers, staff, or students other than the contact person used the system. The contact person emerged as the key link in the process of diffusion of Telidon into his or her educational institution. The administrative position of the contact person could influence the use of Telidon within a site. For instance, librarians or resource teachers were usually more effective in disseminating information about Telidon than classroom teachers. The workload, motivation, and academic discipline of the contact persons affected their promotion of Telidon and its subsequent use at each site.

2.2 Printed Documentation

There was a demand, at the elementary and secondary schools, for printed support materials. Teachers requested documentation on basic technical issues, and on pedagogical matters as well. They wanted suggestions on what Telidon material to use and how to use it. This demand came especially from those who had not produced sequences or had not used Telidon at the sites. Interviews with teachers suggested that the desire for printed material may have been part of a larger need for guidance on how to apply Telidon to teaching.

3 Assessment of Telidon Sequences and Databases

3.1 Size of the Database

Participants in the field trial could access a TVOntario educational database of 60 sequences. A sequence is a series of Telidon "pages" or videoscreens of image and text. The pages of sequence are all organized around a common theme or structure. For instance, a sequence may be a quiz on world history composed of 50 pages — some presenting questions, others providing answers. The sequences in the database varied considerably in form and content — from games to structured lessons to simple lists of information.

The creation of a 60-sequence database was a major effort, involving considerable human resources. Volunteers from the various sites produced sequences at TVOntario offices, on special minicomputers designed for page and sequence creation. The Telidon project team included sequence creators who produced their own sequences and trained and assisted the volunteers.

Despite this effort, Telidon users considered the field trial database too small. In a survey conducted at the end of the field trial, experienced users rated the lack of sequences of appropriate subject matter and educational level as the largest impediment to Telidon use. While 60 sequences represent a considerable achievement, they were spread over 45 institutions, and many different courses of study and educational levels within each.

3.2 Graphics and Educational Design

The Telidon graphics were truly impressive — users of all ages and educational backgrounds were impressed with what they saw. However, the effective use of graphics in a sequence was found to be a subtle and at times difficult design problem. In the opening pages of a sequence, a graphic may serve as a stimulant, whetting the appetite. Graphics that are essential to the purpose of the sequence were also very successful — for instance, maps in a sequence on geology. However, it was found that if a nonessential graphic is repeated throughout a sequence, it can be frustrating to the user.

3.3 Information Searches with a Menu-Driven Branching Structure

Telidon graphics and text are compatible with a variety of types of computers and can be used with different methods of accessing sequences. In the field trial, the assessing system required the user to make a series of selections from indexes displayed on the screen. The indexes were arranged hierarchically — moving from the general to the specific. The user first searched for the sequence of interest at the most general level — for instance, choosing "education" over "news" or "government services." The user would then move to the next index, choosing among history, science, or literature sequences. In this way the user searched for and retrieved the sequences of interest by consulting a series of indexes, or as they are called in computer parlance, "menu pages."

Librarians and experienced computer users found the menu-driven user searches relatively inefficient. In the search for one page of information many preceding "menu" pages had to be examined. Other users recommended that the menus include cross-references and descriptors to make searching for sequences easier and quicker. The database during the field trial was relatively small, so this problem of accessing on-line information would be compounded in growing databases.

3.4 Computer-Assisted Instruction

Several computer-assisted instruction sequences were created for the TVOntario database. In these sequences students learned material presented on the Telidon screen and answered questions on the content materials as they proceeded through the sequence.

Users familiar with computer-assisted instruction instruction applications on other computer systems found the Telidon sequences limited in comparison. For instance, the system as configured during the field trial had no form of record keeping; students could not be identified by the computer and perfor-

(Continued on page 14)

Avi Soudack and **Bob Karam** are research officers at the office of project research, TVOntario

* The Telidon Field Trial and formative research effort were supported by the Federal Department of Communications and TVOntario. The authors would like to thank Pat Parsons, Hélène Pedneault, and Kay Duggan for their contributions to the research, and acknowledge the assistance of John Syrett, director of the Telidon Field Trial, TVOntario, and Olga Kuplowska, manager of the Office of Project Research, TVOntario. The opinions expressed in this paper are solely those of the authors.

From the Media Periodicals

By Richard Ellis

BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY, 15:1, January 1984
Barker, Philip G., "An approach to multi-media authoring"
Prosser, M.T., "Towards more effective evaluation studies of educational media"
Lopez, Mario, "Resources centres in departments of higher education: a survey in Great Britain"

CLASSROOM COMPUTER LEARNING, 4:9, April/May 1984
Green, John O., "Tomorrow's jobs for today's computer specialist"
Hannah, Larry and Charles Matus, "Teaching ethics in the computer classroom"
Harvey, Wayne, "Which programming language is right for you?"
Dyrli, Odvard Egil, "The hardware game: sorting the winners from the losers"

COMPUTERS IN EDUCATION, April 1984
Lenk, Frank, "Icon progress report"
Lenk, Frank, "Word processing — a mini — survey"

EDUCATIONAL COMMUNICATION AND TECHNOLOGY, 31:4, Winter 1983
Mellon, Constance A., "Instructional development as a social movement: an illustration of analogical theorizing"
Krendl, Kathy A. and Bruce Watkins, "Understanding television: an exploratory inquiry into the reconstruction of narrative content"
McCombs, Barbara L. and Mark A. McDaniel, "Individualizing through treatment matching: a necessary but not sufficient approach"
Johansen, Keith J. and Robert D. Tennyson, "Effects of adaptive advisement on preception in learner-controlled, computer-based instruction using a rule-learning task"

EDUCATIONAL TECHNOLOGY, 23:12, December 1983
Roberts, Franklin C. and Ok-choon Park, "Intelligent computer-assisted instruction: an explanation and overview"
McMeen, George R., "The academic challenge of technological change for leadership in educational technology"
Yeaman, Andrew R.J., "Microcomputer learning stations and student health and safety: planning, evaluation, and revision of physical arrangements"
Baker, Patti R., "Computer color graphics and monochromatic display: are they compatible?"
Singarella, thomas, "A system for the international distribution of educational media"

EDUCATIONAL TECHNOLOGY, 24:1, January 1984
Hataway, Michael D., "Variables of computer screen display and how they affect learning"
Bear, George G., "Microcomputers and school effectiveness"
Cohen, Vicki Blum, "Interactive features in the design of videodisc materials"
Jonassen, David H., "The generic disc: realizing the potential of adaptive, interactive videodiscs"
Zollman, Dean, "Videodisc-computer interfaces"
Gorth, William Phillip and Paula M. Nassif, "A comparison of microcomputer-based, computerp-managed instruction (CMI) software programs (with an evaluation form)"

EDUCATIONAL TECHNOLOGY, 24:2, February 1984
"An educational technology interview: educational computing software: state of the art in 1984"
Driskell, James E. and Daniel J. Dwyer, "microcomputer videogame based training"
Lindenau, Suzanne E., "Lights and wires in a box: the computer-oriented information age in support of effective higher education"
Talab, Rosemary Sturdevant, "Copyright, fair use, and the school microcomputer lab"
Splittgerben, Fredric L. and Norbert A. Stirzaker, "Computer technology for administrative information and instructional management in school districts"
Raimondi, Sharon L., "Electronic communication networks"

EDUCATIONAL TECHNOLOGY, 24:3, March 1984
Waggoner, Michael, "The new technologies versus the lecture tradition in higher education: is change possible?"
Diem, Richard A., "Preparing for the technological classroom: will we meet the challenge?"
Goodman, R. Irwin, "Evaluating scripts for instructional media programs: a structured script evaluation procedure"
Leiblum, M.D., "Some principles of computer-assisted instruction, or How to tame the flashing beast"
Salisbury, David F., "How to decide when and where to use microcomputers for instruction"

EMERGENCY LIBRARIAN, 11:3, January/February 1984
Meadley, Pat, "The librarian: a computer program for elementary schools"

INSTRUCTIONAL INNOVATOR, 29·1, January 1984
"Exemplary programs in computer literacy"
Hord, Edwin V., "Guidelines for designing computer-assisted instruction"
Kennedy, Patricia H. and Ruth A. Camuse, "Selecting software on a budget"

JOURNAL OF COMPUTER — BASED INSTRUCTION, 11:1, Winter 1984
Tennyson, Robert D. et al., "The Minnesota adaptive instructional system: an intelligent CBI system"
Raschio, Richard and Dale L. Lange, "A discussion of the attributes, role, and uses of CAI materials in foreign languages"

MEDIA & METHODS, 20:5, January 1984
Howe, Samuel F. "Robots in the classroom"
Lebow, Max A., "The view from silicon row"

MEDIA & METHODS, 20:6, February 1984
Webb, Agnes, "Teaching writing in a video studio"
Lebow, Max A., "The view from silicon row — part two"

(Continued on page 16)

Mediography

Media on Educational Innovation

By Nancy Lane

The programs listed this time focus on educational innovation in the school setting, with a particular emphasis on alternative styles of education.

THE BRITISH INFANT SCHOOL — SOUTHERN STYLE Motion Picture, Promet/Kinetic, 1973 30 min., sd., col.
An open classroom program with emphasis on the integrated day, vertical grouping and problem solving strategies.

CATCH 'EM BEING GOOD: APPROACHES TO MOTIVATION AND DISCIPLINE Motion Picture, PH/Marlin, 1980 26 min., sd., col.
An extensive illustration of a positive approach to motivating students.

CLASSROOM LEARNING CENTERS Motion Picture, Promet/Kinetic, 197 - 32 min., sd., col.
Teacher-made learning centers are the subject of this film.

CREE WAY Motion Picture, NFB, 1977 26 min., sd., col.
A curriculum development project incorporating the culture and life-style of the local people is depicted here.

DARE TO DISCIPLINE Motion Picture, MFFD/VEC, 1982 27 min., sd., col.
This program examines the six steps in the "Back to Basics" discipline approach.

DYNAMICS OF CLASSROOM BEHAVIOUR Videorecording, GPN/ITF, 197- 30 min. ea., sd., col.
A series of 12 programs, video taped in a classroom setting, with Dr. Rudolph Dreikurs. Titles include "The Collision Course of Education", "Key to Understanding", "Positive vs. Negative Action".

THE GREAT AMERICAN STUDENT Motion Picture, CORF, 1979 18 min., sd., col.
A look backwards. Clips from Coronet's films made in the '50's depict the picture of the typical high school student. At interesting analysis of the times, issues and educational techniques — a contrast to the innovation seen in today's classrooms.

K.C.I. BEYOND THE THREE R'S Motion Picture, NFB, 1982 28 min., sd., col.
Kitchener Collegiate Institute is the subject of this program which looks in a positive way at this school as an example of public education.

LEARNING A HAPPY EXPERIENCE Motion Picture, Sterling/Marlin, 1978 16 min., sd., col.
This film illustrates a number of techniques useful for motivating learning in classrooms.

A LESSON FOR TEACHER Motion Picture, BBC, 1976 50 min., sd., col.
This program reviews the primary school situation taking into account current research which compares the effects of the formal and free style methods of education.

MARVA Motion Picture, Carouf/Marlin, 1980 17 min., sid., col.
From "60 Minutes", an interview with Marva Collins. This film illustrates a no-frills, back-to-basics school in a low income district.

MONTESSORI: A WAY TO GROW Motion Picture, Promet/Kinetic, 1979 32 min., sd., col.
An examination of Montessori methods and principles.

MULTI-CULTURAL EDUCATION: A TEACHING STYLE Motion Picture, MFFD/VEC, 197-29 min., sd., col.
Classroom approaches to an appreciation of cultural plurism are shown here.

THE NEW BOYS Motion Picture, NFB, 1974 28 min., sd., col.
A look at St. John's Cathedral Boy's School at Selkirk, Manitoba — a school combining strict discipline, outdoor education, academics, and Christianity.

NUEVA: AN ALTERNATIVE Motion Picture, UCEMC/ITF, 1974 18 min., sd., col.
Humanistic principles are seen here in practice in an elementary school.

THE OPEN CLASSROOM IN AMERICA Motion Picture, IDEA/ITF, 1972 22 min., sd., col.
An illustration of discovery-oriented classrooms.

THE POWER OF POSITIVE REINFORCEMENT Motion Picture, CRM/MGHT, 1978 28 min., sd., col.
A presentation of behaviour modification both in and out of the classroom.

RIDLEY: A SECRET GARDEN Motion Picture, NFB, 1982 27 min., sd., col.
Ridley, a private school for boys, in Ontario is the subject of this documentary. An interesting contrast to "K.C.I. — Beyond the Three R's".

SUMMERHILL Motion Picture, NFB, 1966 28 min., sd., col.
An interesting example of a school with no fixed rules.

SUCCESSFUL TEACHING PRACTICES Videorecordings, EBEC/VEC, 1983 15 programs, 26 min. ea., sd., col.
This series looks at teaching strategies and ideas. Titles include "Teaching is an Attitude", "Free to Teach", "Unchanging Teachers", and "Innovative Teaching".

TEACHER EFFECTIVENESS TRAINING Motion Picture, MFFD/ITF, 1973 29 min., sd., col.
Thomas Gordon's system of management and motivation is described here.

THEY ALL LEARN Motion Picture, Promet/Kinetic, 1978 28 min., sd., col.
Another illustration of the open classroom, with the focus on a rural setting.

(Continued on page 16)

COMPUTER NEWS
Continued from page 3

New Software Evaluation Instrument

The National Science Teachers Association (NSTA) has published a new Microcomputer Software Evaluation Instrument. Prepared by the NSTA Task Force on Assessing Computer-Augmented Science Instructional Materials the new instrument is designed to be used primarily in school-level or district-level evaluations of science instructional software packages.

The eight-page instrument appears in the January 1984 issues of NSTA's perodicals, *The Science Teacher, Science and Children and the Journal of College Science Teaching.* Copies may also be obtained from NSTA, 1742 Connecticut Avenue NW, Washington, DC 20009.

For more information, contact Leopold E. Klopfer, Prof. of Educ., Chair, NSTA Task Force, Univ. of Pittsburgh, LRDC Bldg., 3939 O'Hara St., Pittsburgh, PA 15260. 412/624-4821.

Free Access to On-Line Software Library Offered by Searchmart

Searchmart Corp., a South Florida firm specializing in database development and information retrieval systems, is offering a Free Access Software Library that lists, describes and demonstrates tens of thousands of individual applications and systems software packages online.

This library of systems and applications software will be updated daily and categorized by manufacturer, publisher or vendor, operating systems compatibility, protocol requirements, program classification, features, price and ordering information.

The unique feature is the free on-line access to the software database. "There are several services with software databases," states Searchmart's president, Victor Gruneau, "but they charge substantial fees for making searches and they are not available on-line to software shoppers who want to search the files on home or office terminals at their convenience."

Searchmart's Free Access On-line Software Library allows anyone with data communications capability to search the software database.

Software manufacturers and vendors will describe their products and companies on "pages," each page a 40-character by 20-line CRT screen. "They'll have the opportunity to give the software shopper as much information as they want — even demonstrations — and at a very modest cost per page."

For more information, contact Mary K. Hamm, Marketing Services Director, Searchman Corporation, 636 U.S. Highway 1, Suite 210, North Palm Beach, FL 33408. Or Call 305/845-2996. □

FORMATIVE RESEARCH
Continued from page 11

mance statistics were not compiled. Further, the system did not allow the direct entry of text or numeric responses to a question posed in a sequence: the user could only enter page numbers through a numeric key pad. Of course, these problems are not endemic to Telidon, whose graphic system can be adapted to different host computing facilities and technical configurations. However, they alert the developers of Telidon systems to the need to ensure that any computer-assisted instruction sequences are sufficiently flexible in design and powerful in computing ability to compete with other available systems.

3.5 Learning Impact

A preliminary evaluation of one computer-assisted instructional sequence suggested that certain Telidon sequences may be effective for some students and ineffective for others. In this study more advanced students learned as well from Telidon as from a traditional teacher presentation. However, students in general-level classes who learned from Telidon tended to score less well on learning tests than students taught by a teacher. The sequence studied covered a small portion of the grade 9 mathematics curriculum and allowed students to go through the material without teacher assistance. Though this study could not employ complete controls on all related variables, these findings indicate that educational sequences must be designed with careful consideration of how and with whom they will be used.

3.6 Designing Sequences

Findings on the role of graphics and the possible differential impact of sequences were combined with sequence creators' comments to provide suggestions for the development of effective sequences. For instance, teamwork in creation, such as matching educators with graphic designers, may be one way to keep sequences properly targeted and avoid an overemphasis on any aspect of a sequence. Pre-testing sequences with target users would also be effective in sharpening the design and avoiding possible misuse of a sequence. In order to maximize the use of the database, some form of need assessment should also precede the creation of sequences.

FORMATIVE EVALUATION AND THE TELIDON FIELD TRIAL

A substantial body of research is finally emerging in the wake of the enthusiasm for educational applications of the new videotex technologies. Researchers are beginning to examine the antecedents, applications, and effects of these new systems. One important type of research is applied formative research, which can affect planning and development directly.

The field trial explored the potentials of Telidon technology as an educational tool. It also provided the opportunity for the formative research to be conducted. We hope that the findings and recommendations will be useful for researchers and practitioners working with Telidon and other innovative educational technology.

REFERENCES

Bowers, O.G., and Cioni, M. 1982. **Telidon and Education in Canada.** Toronto: Ontario Educational Communications Authority.

Office of Project Research. 1982. **Telidon and Education: A Formative Evaluation for the TVOntario Field Trial, 1981-82.** Report No. 16.

Tyrett, J.H. 1981. "Project Report: Telematics." **Canadian Journal of Educational Communication** 11,2: 20-21. □

LOGO PROGRAM

Continued from page 6

Watt, D. **Final report of the Brookline logo project: profiles of individual student work.** Logo Memo 54, MIT Logo Group, 1979.

Watt, S. Logo in the schools, **Byte,** August 1982, **8** (7), 116-134.

Watt, D., & Weir, S. Logo: a computer environment for learning disabled students. **The Computing Teacher, 5** (8) May 1981.

Weir, S. **The evaluation and cultivation of spatial and linguistic abilities in individuals with cerebral palsy** (Memo No. 470). MIT AI Labortaory, Cambridge, October 1979. □

LOVE'S LABOUR'S LOST
Continued from page 7

companions come out to meet the ladies outdoors. Negotiation and bargaining follows, but some essential papers have apparently not arrived, so the princess and her ladies must stay the night. The negotiations are firm, but towards the end it is obvious that the king is quite taken by the Princess.

Act III. Don Armando is in love . . . with the dairy maid. He asks his page to sing for him. A verbal duel between Moth and Don Armando discusses love, and the dairymaid's probable virtue. Finally Don Armando, desperately in love, determines to release Costard from his custody, so that Costard will deliver a message to his love.

Enter Biron. He too, apparently is in love, (Isn't everybody?) and he gives Costard another letter, destined for Rosaline. Thus Shakespeare contrasts the physical passion on the one hand, with true, honest love, on the other. And Costard now has *two* letters to deliver.

Act IV. There are three scenes in this act. The princess and her ladies are going shooting in the forest, when they are interrupted by Costard carrying the love letter meant for Rosaline. The princess asks that the letter be read aloud. It is full of pomposity. And, it is, of course, the wrong letter.

The second scene introduces two new characters, the school teacher and the curate. Jacquenetta enters with her letter. Since she is illiterate, she asks the curate to read it for her, which he does, and which the school teacher is able to promptly criticise. Again it is the wrong letter, which the characters note, and so they send Jaquenetta to the king!

Scene three. Biron is rediculed by the King, Longaville, and Dumain who see that Biron is the first to break his oath. In a quick philosophic flourish, Biron explains that the only real books are the eyes of the ladies! argument is enthusiasticlly accepted, and the four determine to go off and study what should be studied!

> "For women's eyes this doctrine I derive:
> They are the books, the arts, the academes,
> That show, contain, and nourish all the world."

Act V. More fun is made of jargon and pedantry as the schoolmaster, the curate, the constable, and Don Armando go at each other full tilt. Moth epitomizes the jargonistic humor in which all indulge, saying that "They have been at a great feast of languages, and stolen the scraps." But it is Costard who ultimately produces the longest word of them all, probably good enough to enter the *Guiness Book of Records* . . . Honorificabilitudinitatibus.

The final scene returns us to the princess and her ladies. All have received gifts from their admirers. Upon hearing from their page that the men are about to make an appearance dressed in Muscovite costume, the ladies determine to disguise themselves. Indeed, the "Muscovites" woo the wrong girls! The humorous Pagent of the Nine Worthies follows as entertainment. Suddenly the merriment is broken as Don Armando is accused of getting Jacquenetta pregnant. And more bad news arrives. The King of France is dead. The princess resolves to return home immediately. The men all proclaim their intentions but the ladies decide to make their lovers wait a full year before they will marry them. Even Don Armando will have to prove himself . . . he will spend three years trying to be a farmer! And so, as the play comes to an end, love has been proclaimed, but, at least a year must pass before any marriages will take place. Indeed, for the moment at least, love's labour had been lost.

We began our discussion with a look at the art/science dichotomy so often cropping up in educational technology of the 1980's. We have concluded with Shakespeare's metaphoric analysis in terms of love and study. Who wins? Shakespeare is predictably ambiguous. Perhaps we should be the same. Educational technology is more than a concept; it is a state of mind. And educational technologists will appreciate that in Love's Labour's Lost, the master playwrite is . . . just possibly . . . speaking to us.

* * *

We began our discussion with a look at the art/science dichotomy so often cropping up in educational technology of the 1980's. We have concluded with Sheakespeare's metaphoric analysis in terms of love and study. Who wins? Sheakespeare is predictably ambiguous. Perhaps we should be the same. Educational technology is more than a concept; it is a state of mind. And educational technologist will appreciate that in Love's Labour's Lost, the master playwrite is . . . just possibly . . . speaking to us. □

MEDIA NEWS

Continued from page 9

Multimedia for Manitoba?

An association for multi-image in Manitoba is in the process of being established. Those interested, or those in other provinces belonging to similar associations with ideas which might help the fledgeling organization, are invited to contact Cliff Kehler, c/o Inland AV, 1645 St. James St., Winnipeg, R3H 0X1. □

MEDIA PERIODICALS
Continued from page 12

MEDIA IN EDUCATION AND DEVELOPMENT, 17:1, March 1984
Radcliffe, John, "Computer literacy worldwide"
Zammit, J. Ann, "TV and development education"
Faulder, Dominic, "Learning on air"
Golda, Klaus, "Learning maths by radio"
Hart, Andrew, "Science, television and the adolescent"

PROGRAMMED LEARNING & EDUCATIONAL TECHNOLOGY, 20:3, August 1983 (Special issue: "Tele-education: a Canadian perspective")
Daniel, John S., "Independence and interaction in distance education: new technologies for home study"
Forsythe, Kathleen, "The human interface: teachers in the new age"
Rich, Tom, "The impact of computers on Canadian schools"
Belanger, J. Jean R. and Raymond D. Sapp, "Project U—Train / CAL: NATAL as an authoring language"
Carl, Diana R., "Creating a duet: using video and video teleconferencing to meet the needs of the community"
Lewis, Richard F., "Using Canadian Sesame Street segments in elementary classrooms to teach French"
Lamy, Therese and France Henri, "Tele-université: ten years of distance education in Quebec"
Vázquez-Abad, Jesus and P. David Mitchell, "A systems approach to planning a tele-education system"

PROGRAMMED LEARNING & EDUCATIONAL TECHNOLOGY, 20:4, November 1983
Macintyre, A., "The use of school broadcasting: research findings and implications for change"
Ward, R., et al., "Interactive computer learning for the classroom: problems and principles"

SCHOOL LIBRARY MEDIA QUARTERLY, 12:3, Spring 1984
Callison, Daniel, "Justification for action in future school library media programs"
Bernhard, Keith E., "Computer applications in the library media center: an introduction to electronic spreadsheets"
Yerkey, A. Neil, "Small business microcomputer programs: tools for library media center management"

Note: with this issue, Richard Ellis, reference librarian, Faculty of Education, University of Manitoba, takes over this column from Patrick Wright. Mr. Wright is taking a sabbatical in England. We sincerely thank him for his contributions to CJEC over the last six issues.

— D.H.

MEDIOGRAPHY
Continued from page 13

THIS IS THE WAY WE GO TO SCHOOL Motion Picture, HI/Scope, 1972 28 min., sd., col.
Three pre-school programs are compared here — one based on cognitive theory, one on behaviourism, one a combination.

WANDERING SPIRIT SURVIVAL SCHOOL Motion Picture, NFB, 1978 28 min., sd., col.
This school in Ontario, combines a program of subjects, Indian legends, traditions, language and crafts.

WILLINGLY TO SCHOOL Motion Picture, BBC, 1978 45 min., sd., col.
A look at some of the changes in British schools, emphasizing the implications of Piaget's work.

MEMBERSHIP

AMTEC MEMBERSHIP APPLICATION

ASSOCIATION for MEDIA and TECHNOLOGY in EDUCATION in CANADA
L'ASSOCIATION des MEDIA et de la TECHNOLOGIE en EDUCATION au CANADA

NAME
TITLE
ADDRESS
Postal Code
TELEPHONE — Bus. Area EXT.
Res. Area

PLEASE COMPLETE THIS FORM A
MAIL WITH YOUR PAYMENT TO:
Guy Leger
Asst. Superintendent of Curricu
Metropolitan Separate School Bo
80 Sheppard Ave. E.
Toronto, Ontario M2N 6E8

TYPE OF MEMBERSHIP
(please check one)
☐ Student . . . . . $ 20.00
☐ Individual . . . . $ 40.00
☐ Institutional . . . $ 60.00
☐ Commercial . . $110.00

CANADIAN JOURNAL OF EDUCATIONAL COMMUNICATION
☐ is available to non-members on a subscription basis — four issues per year . . . $40.00

SPECIAL INTEREST GROUPS
☐ Media Utilization
☐ Instructional Developers
☐ Media Teachers
☐ Media Managers
☐ Microcomputers in Education
☐ Other: _____

WORK ENVIRONMENT
☐ Elementary
☐ Secondary
☐ College
☐ University
☐ Business
☐ Government

Canadian Journal of Educational Communication
Vol. 13 No. 4
October, 1984
ISSN 0710-4340