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Contents

	2	Executive, 1981-82
George Cathcart	3	Editorial
George Cathcart	4	Alberta Society for Computers in Education
Stephen Kemp	9	Apple Pilot: An Authoring Alternative
Gloria Cathcart	12	Computer Literacy for Parents
Cori Lyn Cathcart	13	Computers
Don Wiederanders	15	The Urgent Need for Curriculum-Integrated Micro-computer Software
M. Bernadine Tabler and Marilyn Hall Jacobson	18	Ideas
George Cathcart	25	Programming Problems for Secondary Students
William J. Bruce and Roy Sinclair	26	Problem Corner



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Mathematics Council Executive, 1981-82

PRESIDENT

Gary R. Hill Res. 327-5601
310 Laval Blvd. Bus. 329-1243
Lethbridge T1K 3W5

PAST PRESIDENT

Dick Kopan Res. 271-5240
23 Lake Crimson Bus. 271-8882
Close S.E.
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Rod Anderson Res. 435-5580
3528 - 104 St. Bus. 429-5621
Edmonton T6J 2J7 ext. 264

SECRETARY

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Box 2069 Bus. 723-5515
Edson TOE 0P0

TREASURER

Brian Chapman Res. 782-3551
Box 1525 Bus. 782-3812
Lacombe TOC 1S0

delta-k EDITOR

Dr. George Cathcart Res. 435-1949
Dept. of Elem. Ed. Bus. 432-4153
University of Alberta
Edmonton T6G 2G5

Monograph (1982) EDITOR

Ron Cammaert Res. 223-4948
Box 1771 Bus. 223-2902
Taber TOK 2G0

FACULTY OF EDUCATION REP.

Dr. Ritchie Whitehead Res. 328-9586
Faculty of Education Bus. 329-2448
University of Lethbridge
Lethbridge T1K 3M4

DEPT. OF EDUCATION REP.

Bruce Stonell Res. 346-7814
Box 5002 Bus. 343-5262
3rd Floor, West
Provincial Building
4920 - 51 Street
Red Deer T4N 5Y5

MATHEMATICS DEPT. REP.

Dr. Geoffrey J. Butler
Dept. of Mathematics Res. 435-1433
University of Alberta Bus. 432-3988
Edmonton T6G 2G1

ATA STAFF ADVISOR

C.E. Connors Res.
Barnett House Bus. 453-2411
11010 - 142 St. ext. 329
Edmonton T5N 2R1

PEC LIAISON REP.

Norval A. Horner Res. 456-2744
15235 - 117 Street Bus. 973-3301
Edmonton T5M 3V7

DIRECTORS

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SOUTHWEST REGIONAL

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1705 Ashgrove Road S. Bus. 328-5454
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Box 484 Res. 553-4848
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Joan Haig, Treasurer Res. 328-3824
1115 - 8 Ave. S. Bus. 328-9606
Lethbridge T1J 1P7

Editorial

This issue of *delta-k* focuses on microcomputers. Certainly the number of these machines in Alberta classrooms has dramatically increased during the past 12 months and will continue to increase.

In this issue, a detailed report of the October meeting of the Alberta Society for Computers in Education is provided. Stephen Kemp describes Apple Pilot, and Gloria Cathcart talks about her attempts to involve parents in her computer literacy program. My daughter, Cori Lyn Cathcart, wrote a report on computers as a Grade 5 assignment. I have taken the liberty of reproducing her report here.

Shop Carefully for that Computer

Many of us eagerly awaited the release of the School Book Branch's price list for computer hardware and software. These prices were finally released in early December. However, our anticipation quickly turned to disappointment. Not only had prices not been significantly reduced as we had anticipated, but they were considerably higher through the School Book Branch than through local computer stores. For example, figures obtained from one large school system indicated that the complete dual disk system could be bought through local stores on an open tender basis for \$715.28 less than the price quoted by the School Book Branch. Presumably, on a closed tender basis the difference would be even greater.

It could be argued that the Bell and Howell Edumod Model has some features regular Apple does not have. However, these are not many. For example, being able to plug the game paddles into a socket on the outside may be convenient, but the advantage of having the additional electrical outlets can be achieved by buying a \$10 extension cord from your local department store. Furthermore, the lockable cover will probably prove more of a nuisance than an advantage. And as for the extended warranty, only time will tell how much *that* is worth. I found with my own Apple that local computer stores tend to bend over backwards to service their machines for little or no cost well after the warranty is past. Bell and Howell has yet to prove itself in this regard. For example, last May one Edmonton school, interested in purchasing a computer, investigated Bell and Howell. The personnel in the Edmonton office could not answer the simplest of questions and gave the school various Calgary and Toronto numbers to call. Needless to say, I am highly skeptical of Bell and Howell's ability to provide warranty service on a satisfactory basis.

If you do not have a computer store near you, it will probably be well worth your time and effort to drive to a larger centre and shop around. Evidence to date indicates that the School Book Branch is offering no bargains. As a final piece of evidence that this is indeed the case, I decided to call a computer store last December to get an over-the-phone quote on one of their software pieces. I randomly chose Visicalc. Without identifying myself, I asked what they charged for a 16-sector Visicalc. The price of \$225 that they quoted me should be compared to the considerably higher School Book Branch price of \$257.50. Obviously, Mr. King's prices need to be questioned. Clearly, you and I must shop carefully.

In conclusion, I would like to point out that what is perhaps most amusing about this "great deal" is that the government spent nearly two years negotiating it. Bell and Howell is snickering all the way to the bank.

- George Cathcart

Alberta Society for Computers in Education Report of the Annual Conference, October 20-24, 1981

George Cathcart

University of Alberta

The second annual meeting of the Alberta Society for Computers in Education was held on October 20-24 at the Westin Hotel in Edmonton. (For a report on the first meeting see *delta-k*, Volume XX, No. 3, April 1981, pages 5-6.)

The first half of the conference consisted of an exposition by administrators for administrators in post-secondary institutions. Your editor did not attend this portion of the exposition.

Sessions during the second half of the exposition were aimed at educators and instructors in public and secondary schools. During the first general session, Dr. Michael Szabo, Manager of the Instructional Systems Group at the University of Alberta, delineated five pitfalls to the successful implementation of computer-based instruction (CBI) systems. These pitfalls, he said, are symptomatic of the broader problem of poor problem-solving skills. Dr. Szabo correlated characteristics of successful problem solving with potential pitfalls when poor problem-solving skills are applied. Some of the correlations he described are:

1. Problem-solving characteristic: Review what is known about the problem of implementing CBI.

Pitfall: Failure to understand why CBI is the technology most appropriate to the manner in which people learn. (Dr. Szabo said that the effectiveness of CBI has been clearly documented. See Kulik, J.A.; Kulik, C.C.; and Cohen, P.A., "Effectiveness of Computer-Based College Teaching: A Meta-Analysis of Findings." *Review of Educational Research* 50:4 (1980), pp. 525-544.)

2. Problem-solving characteristic: Adequate definition of the problem.

Pitfall: Failure to understand your instructional needs and the change process.

3. Problem-solving characteristic: Adequate data gathering and testing related to the components of a system. (The components required for a CBI system in order of importance are people, courseware, software, hardware, and telecommunications.)

Pitfall: Failure to understand how components of a CBI system can hinder or support your instructional needs.

4. Problem-solving characteristic: Develop a broad range of hypotheses and add or change hypotheses as new data is gathered.
Pitfall: Failure to examine how computer-based instruction can both extend and enhance the tutorial interaction between teacher and learner.
5. Problem-solving characteristic: Determines a reasoned solution to the identified problem within constraints imposed by a system.
Pitfall: Failure to implement a comprehensive, modest-scale evaluation project which is a) designed to meet specific needs, with b) appropriate components, using a c) reasoned-change strategy.

Dr. Szabo proposed the following four-point solution to the problem of effective implementation of computer-based instruction:

1. Develop local leadership teams to implement CBI.
2. Have these leadership teams train their colleagues.
3. Ensure that CBI is evaluated as it is being implemented.
4. Plan to implement CBI over a period of several years.

A more complete text of Dr. Szabo's talk will be printed in *Alberta Printout*.

Minister Announces Support for Microcomputers in Schools

The Honorable Dave King, Minister of Education, spoke at the noon luncheon on Friday. Mr. King was both skeptical and enthusiastic about the implementation of computers in schools. He agreed that there was a real need to get computers into schools because children need to become computer-literate in order to function in our society. At the same time, he warned that computers are not a panacea for all the ills of education. He said that while technology gives us the tools to fashion a better world, this does not necessarily mean that we will use them in that way. In other words, technology does not solve human problems; only humans can solve human problems using the best tools available.

Mr. King then announced a government policy to encourage systematic use of computers in schools. This policy includes the following components:

1. Establishment of an Office of Instructional Technology under the direction of Dr. Jim Thiessen.
2. Development of a computer literacy program at all three levels (elementary, junior high, senior high) for piloting in the fall of 1982.
3. Development of basic hardware standards. A contract has been signed with Bell and Howell for the purchase of a minimum (no maximum) of 1000 Bell and Howell Apple Microcomputers (48K) with dual disk drives, Panasonic monitors, Centronics printers, and a software package. This total package

will be made available to schools through the School Book Branch on the same basis as are other materials. This arrangement is not intended to restrict schools from purchasing other equipment if they so wish, and it is to be reviewed periodically. Similar contracts may be negotiated with other hardware distributors later. The aim, according to Mr. King, is to triple the number of computers in schools in the next 18 months and to reach 20,000 by 1984.

4. Orientation and in-service. Mr. King announced a three-stage in-service program:
 - a. regular orientation supplied by the vendor
 - b. program for coordinating teachers, principals, and other administrators
 - c. orientation for other teachers.
5. Establishment of a computer learning materials clearing house, primarily to serve an evaluative function.
6. Collaboration with other departments of education on cataloguing and indexing of courseware nationally.
7. Provision of research funds in the spring of 1982 for computer-related projects.
8. The establishment of a 12-member ministerial task force to investigate implications of computer use and to make recommendations to the Minister.

Out-of-Province Experts Tell Us How to Do It

Denise Forman from JEM (Joint Educational Management) Research in British Columbia talked about courseware development and evaluation. She maintained that it is essential for teachers to be able to evaluate courseware. Furthermore, she argued that in order to do this effectively, teachers must have some theoretical background which can be obtained through reading relevant literature and viewing a wide variety of courseware.

In designing courseware, she suggested that these steps be taken:

1. Decide who will do the designing, a teacher or a design team.
2. Choose the topic. The rationale for doing the topic on the computer should be made clear.
3. Begin by defining your goals in broad terms and then specify instructional objectives.
4. Do a task analysis by determining the steps the learner must take to reach the objective.
5. Decide on a strategy such as drill and practice, tutorial, simulation, or other. The cognitive styles of the learners should be considered in making this decision.
6. Prepare the story board. This will include the display plus notes for the programmer.

7. Have the programmer judge the feasibility of the program.
8. Code the program.
9. Test the program.
10. Document the program.
11. Field-test the program.
12. Prepare an instructor's guide for the courseware.

Bill Goddard from the University of British Columbia outlined a four-fold focus for computing in British Columbia schools:

1. Computer orientation or literacy. This was initially aimed at all Grade 8 students.
2. Service packages to various subject areas.
3. Computing studies.
4. Administrative packages.

Denis Simair, a third B.C. speaker, reviewed a pilot project using computers in school administration. The project took place in two pilot schools in the Greater Victoria School District. There were three main components to the administrative package:

1. The Administrators' Apple Package. This package contained three subsystems:
 - a. An attendance program which provided the following printouts: absentee lists, bi-monthly attendance totals, letters to parents, and reports to students.
 - b. A demographic program which can accommodate data and provide a variety of printouts for 1200 students.
 - c. A textbook program which provided a variety of data on textbooks used in the school.
2. The Classroom Attendance Program. This package was similar to 1a (above) but provided more detail. For example, a student's absence from specific blocks during the day could be documented.
3. The Scheduling Program. Several steps are required but a master timetable and conflict-free timetables for students can be generated. Class lists, student timetables, and other information can then be printed.

Teachers, administrators, and secretaries all reacted positively to this pilot project. The teachers and secretaries were especially appreciative of the time saved by the system but the administrators didn't report any time saving.

Ruth McLean from Humber College in Ontario discussed her experiences in the area of staff development. She stressed the fact that adults learn but that they learn at a different rate and in a different way than children because they have a wider background of experiences and responsibilities. Since teachers have different needs, goals, learning styles, priorities, and schedules, any staff development program needs to be multifaceted.

The following are some of the activities Ruth McLean has found successful in working with teachers:

1. Awareness seminars. These could include demonstrations of different machines, films, speakers, courseware, and so on.
2. Visits to companies using computers.
3. Visits to trade fairs.
4. Information dissemination. Provide relevant articles, notices of conferences, and so on to teachers.
5. Designation of at least one computer for use by teachers only, not students.
6. Attempts to support and encourage individual initiatives.
7. Offering mini-courses of about six weeks for about two hours a week. These courses could be in basic BASIC or advanced BASIC, they could centre on a project, or they could examine existing software.
8. Ensure that there is a role model available in schools for teachers.

Computers Are Artists!

Gerald Hushlak demonstrated the potential of the computer as an electronic paint brush. He said that technology needs to be added to earth, air, fire, and water as a fifth basic element. Several reasons for this addition were given but Mr. Hushlak emphasized the time saved as a major reason. He pointed out, for example, how in generating a landscape scene, he can start the process, go off and do other things, and then come back hours later to find the computer and plotter still painting. Unlike people, computers work like slaves for 12 or more hours a day without coffee or lunch breaks. Furthermore, they do not spill ink or paint the way human artists do. The result is perfect. In designing a scene, the computer artist, by using a plotter, has access to about 15,000 colors in 64 layers.

Mr. Hushlak also told how computers are used to provide a communications link between seven major museums in London, Paris, New York, and elsewhere. His overall conclusion was that traditional art cannot compete with technology.

Other Sessions

Other sessions at the second annual ASCE conference dealt with such topics as selecting hardware, micro-to-host communications, the computer-managed learning system at SAIT, and the Natal/Telidon connection.

A group of interested individuals met to organize a computer contest. Details of this will be published in the *Alberta Printout*, the journal of the ASCE.

The annual business meeting of the ASCE was conducted Friday, October 23, 1981. Reports from the different departments were given. The new executive for 1981-82 elected at the meeting is as follows:

President: Gene Romaniuk
Vice-President: Harry Babchuk
Treasurer: Steve Hunka

Board of Directors: Hans G. Kratz
Trevor W. Turnbull
Edward Wiecek

Apple Pilot: An Authoring Alternative

Stephen Kemp

*Graduate Student,
Department of Elementary Education,
University of Alberta*

Having access to a computer means deciding on one of two options: either having the computer manage instruction, or using the computer to assist in the teaching process. Choosing the latter is referred to as computer-assisted instruction (CAI). Here again, there are two options: to purchase commercially prepared programs, or to design and author one's own.

Authoring one's own CAI programs allows one to make use of local input and materials, to have direct control over the content, and to create programs that meet one's needs. The problem has been, and probably will continue to be, for some time, the difficulty of finding a programming language that is both powerful and simple.

Only those who have labored long and hard with "FOR-NEXT" loops, "GOSUB" and "IF-THEN" statements in the BASIC programming language can appreciate the difficulties involved in authoring courseware. BASIC was never intended for educational use. Some excellent programs are available, but the factors of time, programming expertise, and machine capabilities have hindered teachers who want to create programs.

As the title suggests, the Apple PILOT programming language is an alternative. It is not the solution by

any means, but it is a reasonably efficient way of displaying text and graphics to create CAI that rises above mere drill-and-practice.

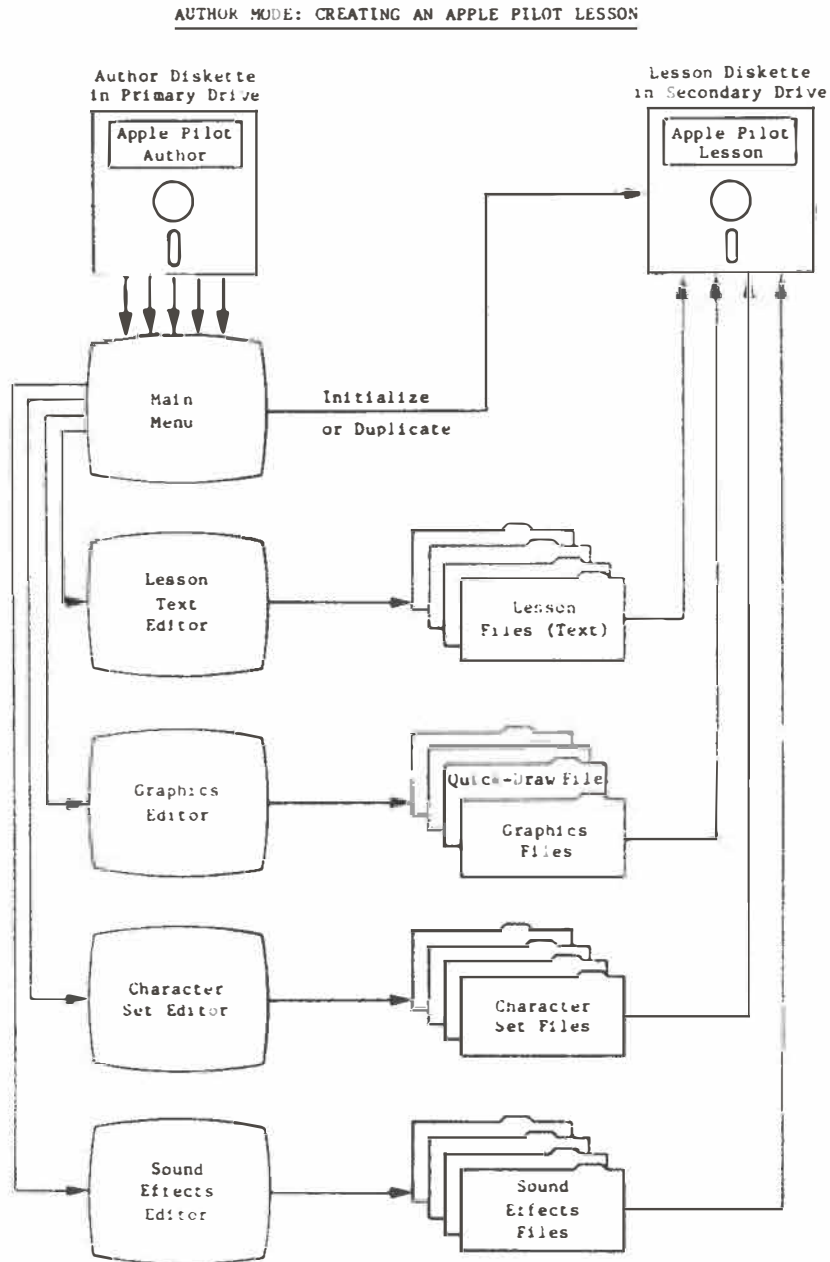
Apple PILOT is the link between an instructional design and the computer that presents it. It is a system, a framework, that allows one to direct the computer to do what one wishes. To use Apple PILOT, one must first learn its grammar which is a language as distinct as BASIC.

The PILOT language has four major components. These components are discussed in the remainder of this paragraph and are illustrated in Figure 1. First, the lesson text editor allows one to create commands which display the text portions of a lesson. Second, the graphics editor allows one to draw lines, boxes, circles, and ovals and to fill these shapes with any of six colors. The graphics can be drawn using either the keyboard keys or the game paddles. Both make possible the creation of reasonably detailed and complex drawings or diagrams. Third, the character set editor allows one to produce a set of new or different characters such as special mathematics symbols or the Russian, Hebrew, or Japanese alphabets! Finally, the sound effects editor allows one to compose music or sound effects to incorporate into a lesson.

Figure 1

DIAGRAM OF AUTHOR MODE

The following diagram shows how Author Mode works. The Main Menu lets the author use various editors to create different kinds of files. The files are combined into a PILOT lesson which is stored on a Lesson diskette.



Reprinted from *Apple Pilot Editor's Manual*, page 7.

Each of these four components is straight forward and easy to use. As one works in each, directions and guidance are either given or are available at the touch of a key. Of course, to use the system confidently and competently, one must invest considerable time. Perhaps the most attractive feature of this system is the fact that it assumes no previous programming experience. Learning the system is simply a matter of learning the commands used to direct the computer to perform an action and the correct grammar for the action to be performed.

As few as five commands are needed for most courseware programs. For example, "T:" means print whatever follows the colon on the screen; "A:" means accept a student's answer to a question; "M:" means match the student's response to one you have decided upon; "J:" means jump to another set of instructions; and "G:" means display a graphic which you previously created. Each of these commands is followed by an instruction. For example, "T:Hello!" is a command for "Hello!" to be displayed. Using these commands and instructions to display text or questions, to accept and match student responses, and then to jump to an appropriate section for review or

enrichment is the basis of any courseware.

Apple PILOT offers features not easily attainable using BASIC and an unmodified Apple II Plus computer. PILOT makes the mixing of text and graphics very easy, something that requires a great deal of programming expertise using BASIC. PILOT text is also available in upper and lower case, a significant feature when the program is being used for primary children. Text editing, that is, the insertion or deletion of text, as well as copying whole portions of text are possible with little difficulty. As well, student response can be recorded in a file for later analysis.

The Apple PILOT system consists of two disks and two manuals. The author disk is the manager of the system used to build the program, while the lesson disk is used to store the completed programs. To author using PILOT, an Apple II or Apple II Plus with at least 48K bytes of memory and dual disk drives are needed. The two manuals that accompany the system are simply excellent. They are clear, concise, and comprehensive. All that is needed to begin programming is interest, enthusiasm, spare time, and - oh yes - a micro!

Editor's note: Apple Pilot is one of the software pieces available through the School Book Branch.

Decimal's In

Knowing her husband's habit of sampling everything she baked, a woman left a note on a dozen freshly baked tarts: "Counted - one dozen!"

On her return she found only ten tarts and a new note: "Think metric!"

(Globe and Mail, May 8, 1981)

Computer Literacy for Parents

Gloria Cathcart

Lansdowne Elementary School, Edmonton

It has been my responsibility, privilege, and delight to provide a computer literacy program for the Grade 5 pupils in Lansdowne Elementary School. I meet with this class for three one-half-hour periods each week. There are 24 pupils in the class and we have only one computer, but that does not prevent us from becoming computer literates or beginning programmers.

Very shortly after launching the program, we became aware that parents were not only curious about our program but were also interested in becoming involved.

One of the early objectives of our course was to become more aware of the impact of the computer on our society. Parental assistance contributed toward the attainment of this objective. To make students aware of the impact of computers, I organized a computer scavenger hunt. Pupils were encouraged to enlist the assistance of their families. Older brothers and sisters as well as parents responded. Students produced delightful collections of computer-related articles such as advertisements, computer-printed documents, computer parts, and other material.

Arrangements were made to show the film "Now the Chips Are Down" to our upper elementary pupils. We extended an invitation to the parents. Approximately 35 parents were able to join us for the afternoon showing of this very informative film.

More recently, we held a Parents' Computer Night which was attended by 40 to 45 parents. At this session the computer program was explained. The school's objectives, activities, and aspirations with regard to computer literacy were presented. The position of Alberta Education as outlined in its news release of October 23, 1981 was also presented. Pupil charts, scrapbooks, card sets, and notebooks as well as a variety of books were on display. Following the introductory presentation, the parents were invited to participate in a hands-on computer experience. Thanks to the Edmonton Public School Board and a neighboring school, we were able to obtain six Apple II Plus microcomputers for this evening. A variety of computer programs was available for tryout. Of great interest and delight to the parents were the programs written by their Grade 5 children. During this brief two and one-half month exposure to one computer, several of these pupils have completed three programs. (This same computer is also used extensively for computer-assisted instruction for other pupils in the school.)

Before leaving the school and on several occasions since the Parents' Computer Night, many parents have expressed their appreciation for our efforts. The one regret appears to be that, due to limited hardware, we have not been able to extend our program to all the pupils on a regular basis.

Computers

Cori Lyn Cathcart

Grade 5 Student, Greenfield Elementary School, Edmonton

Computers are very interesting. They used to be very large but now they are smaller.

A computer is a machine that handles information and works very quickly. A computer helps people in weather forecasting, typesetting, medical diagnosis, education, engineering, science, space programs, and other things. A computer works by electricity.

The earliest computer-like machine was an abacus. In 1830, Charles Babbage invented a computer he called the Analytical Engine. He never did finish his great invention. In 1888, Herman Hollerith used an early computer to take the American census. He used punched cards and did the job in a third the time that was required for the previous census. In 1946, the ENIAC computer was invented. It was a digital computer with vacuum tubes. It was very large, produced a great deal of heat, and was a first-generation computer. In 1951, UNIVAC 1 was invented and was the first to be mass-produced. It too was very large, produced much heat, and was a first-generation computer. In 1960, a computer was made with transistors which was smaller, faster, more dependable, and was a second-generation computer. In 1965, a computer was invented with tiny, integrated circuits and was a third-generation computer. Also in 1965 a computer was invented with tiny integrated circuits on a chip. This was the

beginning of fourth-generation computers.

Analog computers measure things. An example of this kind of computer is a thermometer. When you have a fever, the heat causes the mercury to climb up the tube. Digital computers solve problems by counting. They do this by using their memories.

There are three main parts to a computer: the input, the CPU (Central Processing Unit), and the output. In the input stage, the programmer puts in the instructions and data. They can be put into the computer by using disks, tapes, cards, and so on. The CPU is made up of memory, control, and arithmetic units. This is where all the instructions and data are handled. The output involves getting the processed information out to the user. It comes out to the user in such forms as the video display, printer, cards, and voice.

A program is a set of coded instructions. There are many different programming languages including COBOL, APL, PL/1, FORTRAN, ASSEMBLER, and BASIC. They are used to write sets of instructions for the computer to use. This is how the programmer codes his program: First he assigns symbols to stand for his data. Then he gives the instructions. Then he tells the computer to print the answers. Finally, he tells the computer to stop!

An example of a simple program is the following:

```
READ A,B  
C=A+B  
PRINI C
```

READ A,B tells the computer to place data on locations A and B in its memory. C=A+B instructs the computer to add the numbers at locations A and B and to put that sum into location C. Print C tells the computer to print the sum that is in location C. After all the instructions are in the computer, the programmer must give two numbers (such as 5 and 7) for A and B so that the computer can solve the problem.

Some fields in which computers are used are medical diagnosis, manufacturing, transportation, control room operator, business, and education. Some careers involving computers are being a programmer, a designer, an operator, and a manufacturer.

Now you see how interesting computers are. Computers can do a lot of work for us. Computers used to be very expensive but now they are cheaper. A lot of people have computers in their homes. Some electronic toys are actually small computers.

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(See Catalog - p. 119)

The Urgent Need for Curriculum-Integrated Microcomputer Software

Don Wiederanders

Price Laboratory School, University of Northern Iowa

Sorry, folks, we can't wait. We aren't unsympathetic toward software vendors and their problems of copyright infringement. We'd like to be patient until they've solved the problem of how to provide good quality, affordable software and still make a profit. But we can't wait. We applaud the unselfish efforts of local and regional user groups, but we recognize that most software produced and shared in this way ends up stored randomly on many disks and is accessible only to those who are computer-oriented. We know that eventually these programs will be available to the rest of us. But we can't wait.

The word is out. On main street, on the farm, in the home, and even in schools everyone knows that the fantastic power of the computer is now available. In spite of tight money, funding agencies are buying microcomputers for schools. Overworked teachers are doing a conscientious job of teaching the basics of BASIC to the privileged few who qualify. Every school has its computer enthusiasts. They carry around their boxes of diskettes, exchange games and programming tips, and speak a strange language that is largely unintelligible to the masses. But that's not enough! Affecting the education of ten, twenty, or even fifty percent of our students by the computer just isn't enough. Even if *we* thought it was, the public knows better. We just can't wait.

If we as teachers are going to realize the potential of the computer in education, we are going to have to ensure that its power and versatility are available to complement the existing curriculum. Some futurists predict that the computer will, to a large extent, replace the teacher. Others first want to rewrite the curriculum in a way that exploits the power of the new technology more fully. Unfortunately, even if these alternatives *were* feasible (and they do not seem to be, at least in the foreseeable future), we can't wait. A viable first step toward incorporating the computer with all its power into the existing curriculum is available to us now. What is needed are short programs that will help us to do a better job of meeting the day-to-day needs that confront every classroom teacher. Most of us could use help in presenting "tough" concepts: a tutorial for the student who has been absent, a rerun for the student who "didn't get it," even enrichment for the student who is "marking time." Such help is, or soon will be, available.

Realizing that we can't wait, the Iowa Microcomputer Curriculum Project (a Title IV-C funded project) has taken the first steps toward solving the problem:

- a) obtaining appropriate software
- b) adapting it to the existing curriculum
- c) making it available to all teachers
- d) ensuring that the cost remains nominal.

The IMCP's first task was to define relatively small instructional modules (most programs currently available cover too much material). This we've accomplished. The second and much larger task is to accumulate and disseminate appropriate programs for each of these modules. This we've begun.

Recognizing the magnitude of the task for all levels of all parts of the curriculum, the IMCP decided to begin with the curricula for Algebra I, Algebra II, and geometry. For each course, a two-dimensional matrix identifies relatively small instructional modules. Figure 1 shows part of the matrix for Algebra I.

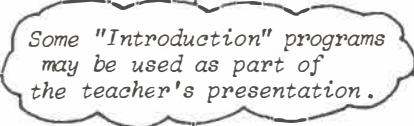
ALBEGRA 1 Concept Module	Concept Development Stages		
	Introduction (I)	Skill Building (S)	Application (A)
1 Simplifying numerical expressions (order of operations including parenthesis)			
2 Variables; evaluation of algebraic expressions and solving simple equations by replacement			
3 Translating word phrases and sentences into the symbols of algebra: a) relatively simple	Disk AI-1 Translating Simple Word Phrases (Introduction) G. Carey	X	
b) more complex	Disk AI-1 Translating Complex Word Phrases (Introduction)	Disk AI-1 Translating Complex Word Phrases (Skill Building)	

Figure 1

*A program is being written or is in the evaluation process for all cells with the "X."

There are 147 cells in the Algebra I matrix, 225 in the matrix for Algebra II, and 162 cells for geometry. The project currently has programs that are written or are being written for nearly 15 percent of these cells. These programs are written by teachers, for teachers, to be used with or by their students. Even though the programs that are currently available have been evaluated extensively and have been revised, they aren't perfect! We accept the fact that no program is ever the best it could be. We believe that these programs are a good beginning and that each succeeding revision will be better. Our goal is to get good instructional software into the hands of teachers now.

We can't wait for perfection. Only the programs that we can use now can help our present students. These programs will also give us a chance to explore the classroom management and instructional dynamics dimensions of integrating the micro into the instructional process.

Phase II of the Iowa Microcomputer Curriculum Project will use the same basic project design to provide microcomputer software to supplement the mathematics curriculum for Grades 5 to 8. Planning has begun for expansion into the physical and social sciences. Though time lines are indefinite, IMCP has made a definite commitment to the total K-12 curriculum. That commitment will be fulfilled as rapidly as human and financial resources make it possible.

At present, there are approximately 40 authors who have contributed programs for evaluation and distribution through the Iowa Microcomputer Curriculum Project. We need many more! Currently, we are committed to handling only programs written for APPLE II DOS 3.3¹ and TRS-80 Model III². By September 1982, we hope to be able to accommodate program users and authors of both the Pet (disk)³ and Atari (disk)⁴. Contributing authors receive appropriate authorship credits and other benefits. Further information can be received by writing IMCP or by subscribing to the *Micros in Mathematics Quarterly* (\$3.00 - U.S., \$3.50 - Canada) available from IMCP, Price Laboratory School, Cedar Falls, Iowa 50613.

¹TM Apple, Inc.

³TM Commodore Business Machines

²TM Tandy, Corp.

⁴TM Atari, Inc.

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(See Catalog - p. 102)



Ideas

Prepared by *M. Bernadine Tabler*, Assistant Instructor,
Indiana University, Bloomington, Indiana

and *Marilyn Hall Jacobson*, Title I Mathematics Co-ordinator,
Monroe County Community School Corporation, Bloomington, Indiana

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"Ideas" this month focuses on computers, how they are used, and some aspects of how they work. The more ubiquitous computers become, the more important it is that citizens understand the computer's possibilities and its limitations. Knowing something about how computers operate can help to increase this understanding. A discussion of the uses of computers and occupations that use computers would be a good way to introduce any of the "Ideas."

Ideas for Teachers

Levels: All grades

COMPUTER OUTPUT

Objective

To provide experience in reading data generated by a computer.

Materials

Worksheets and pencils.

Directions

Discuss the terms *output* and *printout*. Show the students examples of real computer printouts if you can. Then have the students use the information given in the printout on the worksheet to answer the questions.

Answers

(1) Yes. (2) Ethel, Patsy, Tracy, Vera, Virginia. (3) Ethel, Max, Patsy, Vera, and Waldo. (4) Ethel Patsy Vera, Waldo. (5) Bob, Waldo (6) They are girls, have at least one brother, and own a calculator. (8) 7.

Ideas for Teachers

Levels: All grades

INPUT MEDIA

Objective

To introduce the idea of input media used by computers and to illustrate one type of punched card.

Materials

Scissors, worksheet, a rod or pencil, several hole punches.

Directions

Discuss the term *input* and how computers get information. Show some examples of punched and unpunched computer cards if you can. Explain that the cards the students are making are designed for manual manipulation. Then have students carefully cut out the cards on the worksheets. They should punch holes

where the circles are and then follow the directions on the worksheet. Remind them that they are to cut along the dotted lines only if the words in that description DO NOT describe themselves. If the words do apply to themselves, then the hole should remain intact.

Gather the completed cards and use the notched corner to line them up. Then have students answer the questions on the worksheets by putting a pencil or rod through the appropriate hole. All cards that remain on the pencil will contain the names of the students that are in the correct group unless a card has been incorrectly punched or the wrong hole has been selected. If the wrong selections are made, discuss with the class how errors could occur.

Extensions

1. Combine characteristics. For example, find out who owns a calculator and has brown eyes.
2. Students take the data from the cards and make a table like the one in the first "Ideas."
3. Students may select other characteristics and make up punch cards.

Ideas for Teachers

Levels: 4-8

COMPUTER ROAD MAPS

Objective

To introduce flowcharting.

Materials

Worksheet and pencil.

Directions

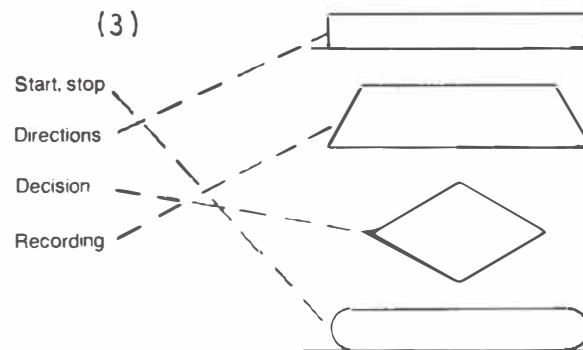
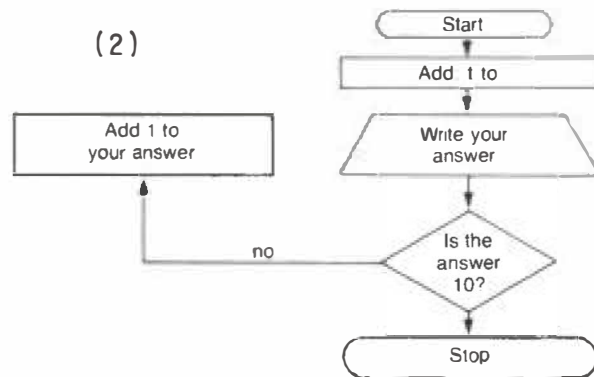
Discuss with the students the purpose of a flowchart and how a flowchart is analogous to a road map.

Flowcharts show the computer the steps to follow to complete a job. Then have the students, working in small groups of four or five, follow the first flowchart. Discuss with the students how you could change the first decision box (Brown eyes?) to answer other questions - the number of boys or girls, the number older or younger than a certain age, the number who have pets, and so on.

Have the students complete the worksheets on their own.

Answers

- (1) Write the numbers from 10 to 0, counting backwards.



Extensions

1. Have students make flowcharts for counting the numbers of people in their families with:
 - birthdays in January, February, or March;

- who like sports;
 - who drive cars;
 - who are in school.
2. Have students suggest other characteristics that could be counted.
 3. Have students make flowcharts that give directions for:
 - writing the even numbers from 10 to 30;
 - identifying the odd numbers between 45 and 57;
 - finding the prime numbers up to 41;
 - listing the things in the room that are shaped like a rectangle;
 and so on.

Ideas for Teachers

Levels: 5-8

PROGRAM THE COMPUTER

Objective

An introduction to simple program writing to solve word problems.

Materials

Worksheet and pencil.

Directions

Go over the sample problem and discuss the number sentence for solving it ($45 - 26 = \square$). Read through the program that tells the computer how to solve the problem. Then have

the students use the program for a model to tell the computer to subtract 12 from 25. Be certain that they note the changed order of the numbers (12, 25) in the program (DATA 25, 12). Review the computer symbols for the operations that are shown next. In particular, show how 24 divided by 3 (or 3 into 24) will be written 24/3. They can proceed then to writing the programs for the rest of the problems.

Answers

All are the same as the sample except for the second and fourth lines:

1. 20 C = A * B
40 5, 23
2. 20 C = A/B
40 354, 3
3. 20 C = A/B
40 108, 4
4. 20 C = A+B
40 27, 39

Extensions

1. Introduce other symbols such as
 - ↑ , raise to a power
 - () , parentheses
 Make up more problems to solve.
2. If possible have the students try their programs on a computer.

IDEAS

Name _____

Computer Output

Printout: Class census, 1981

Name	Girl	Brown eyes	Brown hair	Brother(s)	Sister(s)	Ride school bus	Play music	Like sports	Have calculator
Bob		x		x	x			x	x
Ethel	x		x		x	x			x
Max				x		x			x
Patsy	x	x	x		x	x	x	x	x
Tracy	x		x	x				x	x
Pete		x	x				x	x	
Richard		x	x	x				x	x
Vera	x		x	x		x		x	x
Virginia	x			x					x
Waldo		x	x	x	x	x		x	x

Use the computer printout to answer the questions.

1. Does Patsy have brown eyes?
2. What are the names of the girls in the class?
3. Who rides a bus to school?
4. Who has brown eyes and rides the bus to school?
5. Who has at least one brother and one sister?
6. What do Virginia and Tracy have in common?
7. Use the printout to describe Max.
8. How many more people own a calculator than play a musical instrument?

IDEAS

Name _____

Input Media

Computers sometimes use punched cards to get their input. To see how punched cards can be used—

1. cut out the card at the right,
2. punch out the circles with a hole punch,
3. cut along the dotted lines if the words next to each number do NOT describe you.

When everyone has finished, collect all cards, line them up using the notched corner as a guide, then put a pencil or rod through number 1 to see who the girls are in the group. The boys' cards will fall out. Write the girls' names. Is the list correct?

Use the cards to answer the following questions:

Who has brown eyes?

Who has brother(s)?

Who has a sister?

Who rides the bus to school?

Who plays a musical instrument?

Who likes sports?

Who owns a calculator?

Your name _____

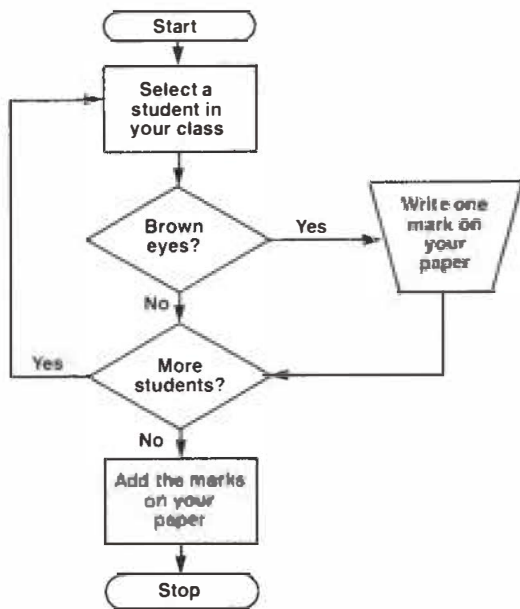
1. Girl
2. Have brown eyes
3. Have brother(s)
4. Have sister(s)
5. Ride bus to school
6. Play musical instrument
7. Like sports
8. Own a calculator

IDEAS

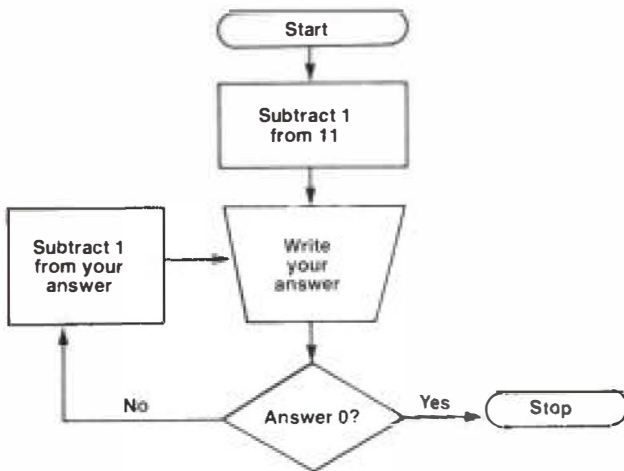
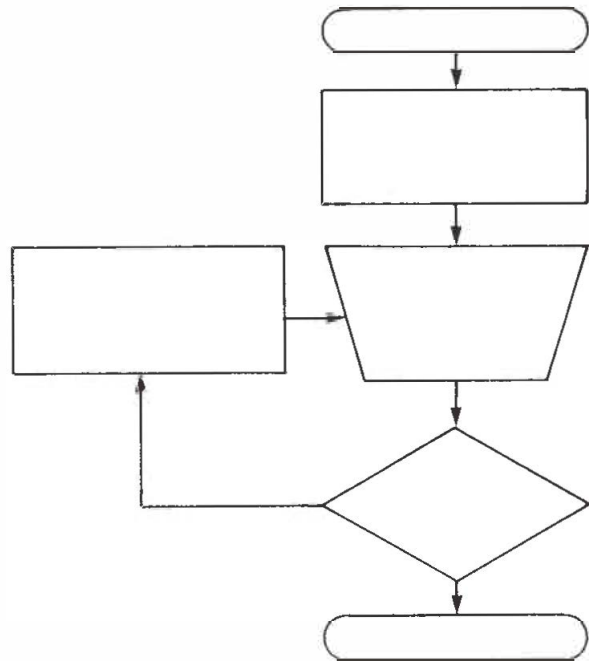
Name _____

Computer Road Maps

1. Follow the directions of the flowcharts below. What job did each have you do?



2. Fill in the flowchart below to give directions for writing the numbers from 1 to 10.



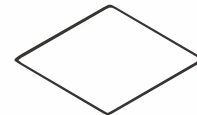
3. Match the flowchart symbols below with the kinds of messages they give.

Start, stop

Directions

Decision

Recording



IDEAS

Name _____

Program the Computer

Sample: Forty-five students tried out for the team. Twenty-six were males. How many were females?

The program at the right tells the computer to subtract 26 from 45 to solve this problem.

Write computer programs for the following problems. The computer symbols for the operations are as follows: + (add), - (subtract), * (multiply), and / (divide).

```
10 READ A, B
20 LET C = A - B
30 PRINT C
40 DATA 45, 26
50 END
```

1. Five people each worked 23 hours on making the scenery for a play. How many hours did they work altogether?

2. The school sold \$354 worth of tickets at \$3 each. How many tickets were sold?

3. One hundred eight chairs were lined up in 4 rows. How many chairs were in each row?

4. Twenty-seven students are on the tennis team and 39 others are on the track team. How many students are on the track and tennis teams?

Programming Problems for Secondary Students

George Cathcart

The following problems are taken from Snover, S. L., and Spikell, M. A., "Problem Solving and Programming: The License Plate Curiosity," *Mathematics Teacher* (November 1981), pp. 616-617.

Snover and Spikell observed a license plate with the digits 183184. The left-most three digits and the right-most three digits form numbers that differ by 1. The number itself is a perfect square.

The following program was written by Snover and Spikell to find all the six-digit squares that have left and right halves differing by 1.

```
10 for C=317 to 999
15 N=C*C
20 L=INT(N/1000)
30 R=N-1000*L
40 D=ABS(L-R)
45 IF D<>1 THEN 55
50 PRINT N,C
55 NEXT C
60 END
```

Activities for Your Students

1. Explain the logic of the above program.
2. Run the program to generate all the six-digit squares that have left and right halves differing by one and their square root.
3. Modify the above program to solve these problems given by Snover and Spikell:
 - a. What are all the six-digit squares whose difference between the left and right halves is 4? Is 9? Is 2?
 - b. What are all the four-digit squares with a difference of one between the left-most and right-most pairs of digits?
 - c. What are all the distinct differences that can occur between the left and right halves of four-digit square numbers?
 - d. What are all the six-digit cubes whose difference between the left and right halves is a cube?
 - e. Two six-digit squares whose groups of two digits are each powers of 2 are 160801 and 161604. Find all six-digit squares with this property. Note that 0 is not considered a power of 2, and 160000 is not, therefore, a desired result.

? ? ? Problem Corner ? ? ?

edited by William J. Bruce and Roy Sinclair

University of Alberta, Edmonton

Problems suggested here are aimed at students of both the junior and senior high schools of Alberta. Solutions are solicited and a selection will be made for publication in the next issue of *delta-k*. Names of participants will be included. All solutions must be received (preferably in typewritten form) within 30 days of publication of the problem in *delta-k*.

Mail solutions to: Dr. Roy Sinclair or Dr. Bill Bruce
Department of Mathematics
University of Alberta
Edmonton, Alberta T6G 2G1

Problem 8:

(Submitted by Roy Sinclair, University of Alberta)

A fly is located 1 m from the ceiling and in the middle of one end of a room. A hungry spider is located in the middle of the other end of the room and 1 m from the floor. Find the shortest path that the spider can take along the surface of the room to get to the fly if the room is 20 m long, 10 m high, and either (a) 10 m wide or (b) 15 m wide.

Hint: Unfold the room surface in each case to lie flat on a plane and solve both problems.

National Council of Teachers of Mathematics Annual Meeting

When:

April 14-17, 1982

Where:

Toronto, Ontario, Canada (Sheraton Hotel and Royal York Hotel)

Major Themes:

- Technology
- Motivation
- Problem-Solving

There will be 298 sections, 174 work sessions, and 64 short subjects.
Some sessions will be offered in both English and French.

Keynote Speaker:

Dr. William Purkey
University of North Carolina

For more information contact:

George Cathcart, Edmonton
Phone: 432-4153

This is the first time that the NCTM has held its annual meeting outside of the United States.

Classroom Quickies

by **Anita Harnadek**

Publisher: *Midwest Publications*

Classroom Quickies is a series of three booklets or dittomasters intended to provide your students with interesting problems that emphasize thinking on those days when your lesson plans do not quite cover the class period - days when there is not enough time for another lesson or for the students to get a good start on their homework assignment but there's too much time to waste. The three books or dittomasters are non-graded and are of secondary level complexity.

Each problem can be thoroughly presented within two to ten minutes, but for many problems, the students will not find the solutions within this time. None of the problems is hard to understand, but solving them is sometimes a different matter, since they range from easy to hard. Each of the three collections of problems has some problems in each range of difficulty but, for the most part, the hard problems in Book 3 require more thought than those in Book 2, and the hard problems in Book 2 require more thought than those in Book 1. Students have been known to work for days, even weeks and months, to solve some of these problems.

Price:

\$ 4.95/book

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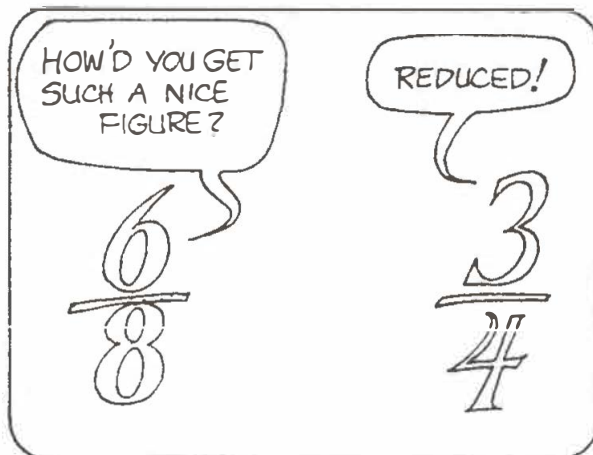
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(See Catalog - p. 81)

IT FIGURES!



From:

Mathematics & Humor

NCTM

MCATA Survey

This is a survey to assist the MCATA executive in providing better and more relevant services to the membership.

General

1. In what capacity do you serve? (Circle as many as apply.)
 - a) elementary teacher
 - b) junior high teacher
 - c) senior high teacher
 - d) administrator
 - e) mathematics supervisor

2. Are you a member of the executive of MCATA?
 - a) yes
 - b) no

delta-K

1. How much of delta-K do you read?
 - a) almost everything
 - b) only those items which look interesting
 - c) hardly any

2. To what extent do you use the activities in each issue with your students?
 - a) I use all the activities suitable to my grade level.
 - b) I use some of the activities at my grade level.
 - c) I rarely use any of the activities.

3. Eight problems (Problem Corner) have been published in the last eight issues. How many of these have you given to your students?
 - a) 7-8
 - b) 5-6
 - c) 3-4
 - d) 1-2
 - e) none

4. The frequency of delta-K (currently 4 issues per year)
 - a) should be increased.
 - b) is about right.
 - c) should be reduced.
 - d) should be reduced to zero.

5. The June 1982 issue of delta-K was replaced with a special issue of the Canadian Mathematics Journal. Did you like this journal?
 - a) yes
 - b) no
 - c) didn't look at it

6. Should the concept of the Canadian Mathematics Journal be continued?
 - a) yes
 - b) no
 - c) not sure

7. If the Canadian Mathematics Journal is continued, it should
 - a) replace one issue of delta-K.
 - b) not replace one issue of delta-K.

8. Would you be willing to pay an extra fee for the Canadian Mathematics Journal if it did not replace one issue of delta-K?
 - a) yes
 - b) no
 - c) not sure

9. Please make as many constructive criticisms as you wish about delta-k.

10. Please comment on the one issue of the Canadian Mathematics Journal.

Math Monograph

1. MCATA has published seven monographs since 1973. Check the ones you have received.
 - a) Manipulative Materials for Teaching and Learning Mathematics
 - b) Mathematics Teaching: The State of the Art
 - c) Metrication: Activities, Relationships, and Humor
 - d) Timeless Activities for Mathematics K-12
 - e) Calculators in the Classroom
 - f) Reading in Mathematics
 - g) Problem Solving in the Mathematics Classroom

2. The monographs have been
 - a) very worthwhile
 - b) okay
 - c) not at all worthwhile

3. The monograph should be replaced with a 2 - 4 page newsletter which would be published more frequently, perhaps 10 times a year. This
 - a) is an excellent idea.
 - b) should be tried on a short-term experimental basis.
 - c) is a bad idea.
4. If the monograph is retained, how could it be improved or how should it be changed?
5. If a short but frequent newsletter were introduced, what suggestions do you have for format, content, frequency, and so on?

Annual Conference

1. Did you attend the 1981 conference in Lethbridge?
 - a) yes
 - b) no
2. How many MCATA conferences have you attended in the last six years?
 - a) 5-6
 - b) 3-4
 - c) 1-2
 - d) none
3. Were you satisfied with the choice of location (Lethbridge) for the 1981 conference?
 - a) yes
 - b) no
 - c) didn't care
4. The MCATA Annual Conference should be
 - a) held in different geographic areas each year
 - b) held in a central location each year
 - c) other
5. I would attend an MCATA Annual Conference
 - a) no matter where it was held.
 - b) only if it was held in my geographic area.
 - c) I wouldn't attend under any circumstances.
6. The 1982 conference will be in Edmonton. Are you planning to attend?
 - a) yes
 - b) no
 - c) undecided

7. Where would you suggest the 1983 meeting be held?

8. Are you prepared to assist with planning or operating the 1983 conference?
 - a) yes
 - b) no
 - c) maybe(If yes or maybe, give name and address.)

9. Please make as many constructive suggestions related to the annual meeting as you care to.

Other

1. What other services would you like MCATA to provide?

2. Are you interested in serving MCATA as an executive member or in some other way? If yes, please give name and address.

Please return this survey to:

Dr. W. George Cathcart
Department of Elementary Education
University of Alberta
Edmonton, Alberta
T6G 2G5

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