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ABSTRACT

Developed to share information presented at a Southwest Educational Development Laboratory Regional Exchange (SEDL/RX) conference, this document includes reports and related materials on educational computing applications in southwestern school districts and states. Basic computer terminology is defined, and software evaluation instruments are provided from the Educational Products Information Exchange Institute (EPIE) and the Microcomputer Software and Information for Teachers (MicroSIFT) project. An article entitled "Computing Competencies for School Teachers," by Jim Poirot, Robert Taylor, and Jim Powell, discusses three sets of teacher competencies: universal computing competencies, competencies needed by teachers of computing, and additional subject-specific computing competencies. Thirty-nine references are listed. Individual reports describe educational computer programs in the following school districts: North Little Rock Public Schools, Arkansas; Humphreys County School System, Mississippi; Jackson Public Schools, Mississippi; Bloomfield Municipal Schools, New Mexico; Putnam City Schools, Oklahoma; and Dallas Independent School District, Texas. A regional sampler includes reports from state education agencies by Sara Murphy, Arkansas; Sue Wilson, Louisiana; Gary Green, Oklahoma; and Gary Haseloff, Texas. A program lists the conference goals, agenda, presenters, participants, and 10 software evaluation resources. Conference evaluation results and a description of SEDL/RX are included. (LMM)

# R&D SPEAKS:
# MICROCOMPUTERS & EDUCATION


SOUTHWEST EDUCATIONAL DEVELOPMENT LABORATORY
211 East Seventh Street, Austin, Texas 78701

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# FOREWORD

The SEDL Regional Exchange (SEDL/RX) Project provides information and technical assistance services to educators in six states: Arkansas, Louisiana, Mississippi, New Mexico, Oklahoma, and Texas. It is one of eight Regional Exchanges in the nation-wide Research & Development Exchange (RDx), funded by the National Institute of Education, which lists as a major goal the dissemination of information about educational research and development (R&D). To assist in accomplishing this goal, the SEDL/RX staff designed and sponsored the R&D SPEAKS: MICROCOMPUTERS AND EDUCATION conference in Austin, Texas on October 5-7, 1981. In an effort to record and pass on to others some of the experience and knowledge that was shared during that meeting, this document was developed.

This is the eighth of a series of R&D SPEAKS conferences sponsored by the SEDL/RX. These conferences provide opportunities for sharing, communication, and growth among researchers and members of the education community.

James H. Perry
Executive Director
Southwest Educational Development Laboratory

# THE COMPUTING PRIMER

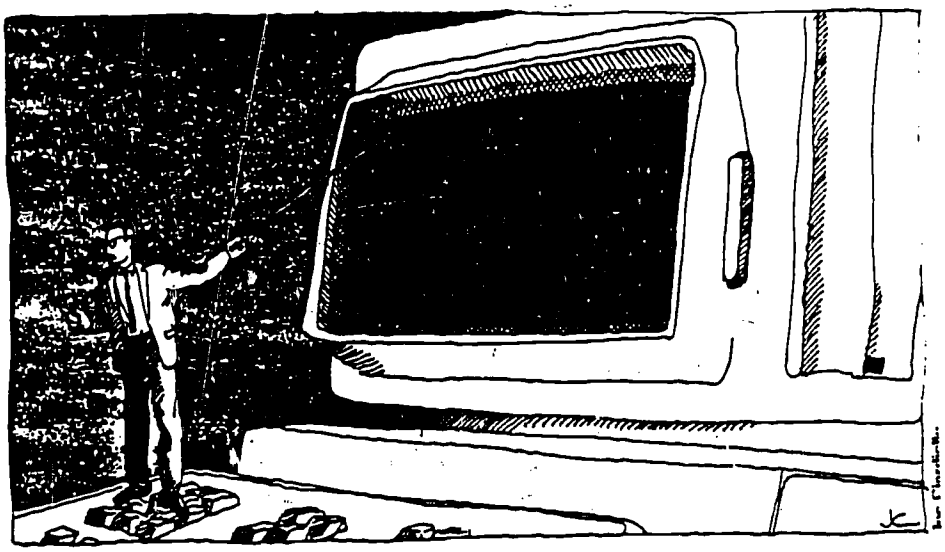
## *EL's Guide to Computers and Computing for the Absolute Novice*

# Part I: A Basic Guide to Computer Terminology

IF YOU'VE BEEN INTERESTED in finding out "what all the fuss is about" when it comes to computers, but felt you needed some basic background about computers in order to even think about the subject, then *EL*'s Computing Primer is the place to start. Beginning with this issue, the Computing Primer offers a series of articles, designed to explain the basics of computers and computing in a simple and straightforward way.

We begin our series with a basic glossary of the words and phrases which we will be using throughout the series. (For a laugh or two, you might also turn to page 72, where you will find some of these same words and phrases defined in a slightly less-than-traditional way.) Future issues will cover topics ranging from the basic components of a microcomputer system and how they work together, to what it means to be computer literate in today's society.

In total, then, the Computing Primer can serve as a sort of introductory course on computing—a course designed for the absolute novice.



A. **COMPUTER:** An electronic device that can accept data (numbers or words), act on the data in performing either arithmetic or logic operations, and produce a result or answer. It is also a device which can follow a set of instructions, called a **PROGRAM.** A computer can be either **DEDICATED** (that is, designed to handle one particular kind of task or serve one particular purpose) or **GENERAL PURPOSE** (that is, designed to handle many different kinds of problems or tasks). General purpose computers are usually referred to as **DIGITAL COMPUTERS.** Today, there are three general categories of digital computers, characterized by their size, their cost, and their information-processing capabilities. Those three categories of computers are:

1. **LARGE-SCALE:** A very large, very expensive computer which can process vast amounts of information at enormous speeds. A large-scale computer can fill a huge room.
2. **MINICOMPUTER:** Physically, a relatively small computer (which might fill one wall), which costs between a few thousand and fifty thousand dollars.
3. **MICROCOMPUTER:** Also known as a home computer or a personal computer, a microcomputer is even smaller than a minicomputer (usually about the size of a typewriter and a small TV set), and costs between a few hundred and a few thousand dollars. It can sit comfortably on the top of a desk.

B. **HARDWARE:** The physical components that make up a computer system. The basic hardware components of a typical microcomputer system generally consist of:

1. **KEYBOARD:** A typewriter-like unit which also houses the **CENTRAL PROCESSING UNIT (CPU)** of a computer. The keyboard is used for entering information or instructions (called **INPUT**) into the computer.
   a. **CENTRAL PROCESSING UNIT:** The "heart" of a computer, which consists of all the computer's necessary circuits for handling information or instructions. This includes **MEMORY** and arithmetic and logic units. In a microcomputer, the CPU is contained on tiny "chips" of silicon (smaller than postage stamps) and is called a **MICROPROCESSOR.**
2. **VIDEO DISPLAY TERMINAL:** A display screen (often a regular TV set) that shows the **OUTPUT** of a computer. Such an output device is usually referred to as a **CRT** (Cathode Ray Tube) or a monitor.

C. **PERIPHERALS:** Any of a number of different physical components of a computer that can help expand its utility. Common peripherals include:

1. **AUDIOCASSETTE RECORDER:** A basic cassette tape recorder than can be used to enter a computer program into the machine, or to save a program on cassette tape.
2. **DISK DRIVE:** A unit that op-

erates a floppy disk.

a. **FLOPPY DISK**: A soft, plastic disk, much like a square 45 RPM record, which is another means for entering a program into a computer. It can also be used for storing information or programs coming out of a computer.

3. **MODEM** (MOdulator/DEModulator): A device that can change a computer's binary code into audio tones or sound waves so that information can be sent or received through telephone wires from one computer to another.

4. **PRINTER**: A unit that can produce on paper the output of a computer. This form of output (as opposed to that on a video display terminal) is called **HARD COPY**.

D. **MEMORY**: A location within a computer system for storing or saving information or instructions. In a microcomputer, memory is usually one of two types—**PRIMARY** and **SECONDARY**.

1. **PRIMARY MEMORY**: Space inside a computer where characters (numbers, letters, or symbols) are stored. The amount of available memory is described in **KILOBYTES** (K), such as "16K" meaning a computer can store (save) roughly 16,000 characters of information.

a. **RAM (RANDOM ACCESS MEMORY)**: This is the main memory of a computer that is accessible to the user. (For example, when you type your name, on the computer's keyboard, the characters of your name are stored in **RAM**). The data stored in **RAM** can be changed or retrieved with lightning speed, but will also be lost when the computer is turned off (unless transferred to secondary or auxiliary storage).

b. **ROM (READ ONLY MEMORY)**: This is storage of information or data that cannot be changed by the user and is used when the computer is turned on. Information in **ROM** is usually built into the computer by the manufacturer, and is where, for example, a language such as **BASIC** is stored.

2. **SECONDARY STORAGE**: Any peripheral device, such as the cassette tape or floppy disk or command module that can save data in the form of output from a computer.

E. **LANGUAGE**: Any of a set of conventions, which may be a number code or a set of vocabulary words, syntax, and grammar rules, that can be used to "communicate" with a computer.

1. **MACHINE LANGUAGE**: The most basic language that a computer can understand. It is made up of binary digits (the numbers 0 and 1).

2. **ASSEMBLY LANGUAGE**: A language that uses different combinations of letters and numbers to stand for the binary numbers in machine language.

3. **HIGH-LEVEL LANGUAGE**: Any of a number of different English-based languages that consist of a set of vocabulary words, rules of usage and syntax, and rules of grammar. Two common high-level languages are:

a. **BASIC**: (Beginner's All-Purpose Symbolic Instruction Code): Said to be one of the easiest high-level languages to learn, and also one of the most widely used languages for teaching with or about the computer in educational environments.

b. **LOGO**: A language specifically developed for helping students to write their own programs.

F. **SOFTWARE**: Generally, any kind of computer **PROGRAM** (a set of step-by-step instructions written in a language a computer can understand and which tells a computer what to do).

G. **MISCELLANEOUS TERMS**:

1. **BYTE**: Equivalent to the storage space needed for one character of information.

2. **BUG**: An error in a computer program. To correct the error is to **DEBUG** it.

3. **INTERFACE**: Anything that connects two or more electronic devices together.

4. **EDITOR**: A program that allows changes or movement of programming statements.

5. **OPERATING SYSTEM**: A special program which allows easier use of external devices, such as disk drives.

6. **WORD PROCESSING**: The storage, manipulation, and processing of text. **EL**

# ISSUES TO CONSIDER IN MICROCOMPUTER USE

# ISSUES IN THE USE OF MICROCOMPUTERS AND EDUCATION

The use of microcomputers in U.S. schools is growing rapidly. According to a telephone survey of over 15,000 school districts conducted during the summer of 1981 by Market Data Retrieval, Inc. (MDR), nearly 42% of those districts have at least one microcomputer at the school district level. Sales of school computers costing less than $10,000 are expected to rise over 300% by 1985. In addition, the MDR survey found:

- 11% of elementary schools have microcomputers;
- 25% of junior high schools have them;
- 43% of senior high schools have them;
- In junior and senior highs the number of microcomputers seems to be tied to enrollment;
- Large districts are more likely to have microcomputers than small districts;
- The number of microcomputers drops as the poverty level of schools increases;

The percentage of school districts with microcomputers in the six-state SEDL/RX region follows:

| | | | |
|---|---|---|---|
| Arkansas: | 23.32% | New Mexico: | 39.36% |
| Louisiana: | 37.84% | Oklahoma: | 22.45% |
| Mississippi: | 36.94% | Texas: | 25.66% |

The mushrooming of this technology has been one reason for the creation of a whole cottage industry of courseware developers, writers, and packagers. The availability and quality of courseware--what goes into the computer--is just one of the many issues educators are facing right now. During the "R&D Speaks: Microcomputers & Education" conference, in panels and small

groups, presenters experienced in the use of microcomputers discussed the issues they regard as important for other educators to consider carefully. A synthesis of these discussions follows. Presenters whose remarks contributed to the discussion are Dr. Robert Taylor, coordinator of the Program in Computing and Education, Teachers College, Columbia University; Dr. Cheryl Anderson, assistant professor of media education, The University of Texas at Austin; Dr. James Poirot, chair of the computer sciences department, North Texas State University; Vicki Blum, doctoral student, Teachers College; Sandy Pratscher, consultant, Region XIII Education Service Center; and Patricia Sturdivant, coordinator, Region IV Education Service Center. Please see the conference agenda for additional details.

Implementation

Many schools are simply buying microcomputers with no coherent plan for their use. Following six basic steps may ease the pain and contribute to clarification of objectives.

1) Define instructional uses and objectives. Will the computer be used as an object of instruction and a tool for problem solving (in a computer literacy program), or will the computer be used as an instructional tool to assist the delivery of instruction in another content area?

2) Define the instructional setting. Will the computer be housed in a laboratory setting? at the back of the classroom? in a library? on a media cart?

3) Based on desired instructional use, define software needs and determine software availability.

4) Evaluate available software. Does the software match your instructional objectives? Is it pedagogically sound? Does it allow for multiple use? Is the reading level appropriate? Does it include documentation, randomization, student control, appropriate feedback, branching, interaction, etc.?

5) Based on stated instructional use and local needs data, determine staff development needs. List possible sources for obtaining necessary staff training.

6) Based on sections 1-5 above, determine hardware needs. How much memory is required? What external storage device is needed? What peripherals are needed now? What peripherals should be added later? What warranty support is the vendor willing to supply?

Control

Who will control the use of the microcomputers in the school? Is the media specialist trained? Will it be the math and science specialists? Math and science tend to be the subjects which first gain access to new techology, but are traditional, and male-dominated, areas. Consider training the liberal arts teachers first to break down stereotypes and encourage the use of technology in non-traditional fields.

Use

How will the computer be used? Three options follow:

1) Tutor: The computer is programmed by an "expert" to assist students with specific learning areas. The computer presents a subject, the student responds, and the computer evaluates the response.

2) Tool: The computer functions well with a specified task i.e., word processing, statistical analysis, or super calculation. The machine might be used as calculator, mapmaker, or text editor.

3) Tutee: The computer is taught to do something through the programming ability of the user. In this model the student becomes a teacher, communicating with the machine in a language it understands.

Who will use the microcomputer? Are all students given equal access, or is it reserved for gifted students? Remedial work? Do boys and girls have equal access? Do students of varying economic levels have equal access? How are users chosen? By whom? Will their use in any way stratify students?

Hardware

Microcomputer developments are progressing rapidly. New and better hardware is coming on the market every day. The diversity of products and the rapidity of change in the development of computer technology make it difficult to commit to a certain machine. Despite the almost certain prospect of obsolesance, the paucity of high quality software, lack of compatability, and the difficulty involved in training personnel on several machines, make hardware standardization an attractive option. Is it possible and or advantageous to provide support for a variety of microcomputers? What selection criteria should be used?

## COST EFFECTIVENESS/PRODUCTIVITY CONSIDERATIONS

The cost of technology is rapidly decreasing, while the cost of labor is increasing. Despite declining enrollments, the costs of education increase each year. Since revenues available for education are shrinking, educators will need to turn to technology in order to improve productivity. Studies which show the cost effectiveness of computers must be documented. Who will coordinate and fund these needed studies?

## DEMONSTRATION AND EVALUATION

It is important to evaluate the progress of instructional computing programs in order to determine their effectiveness with different student populations. How can systematic evaluation be undertaken?

## INFORMATION DISSEMINATION

It is very difficult to stay abreast of new microcomputer developments. The technology is changing rapidly. What information sources are required to use microcomputers successfully? Are networks available?

## MAINTENANCE AND SERVICE

Not all retail dealers provide repair service. Microcomputers tend to be more reliable than larger computers, but when a problem does develop, some brands have to be returned to the factory. This process can take six weeks or more. What service considerations are most important in the selection of a microcomputer?

NETWORKING

Distributed computer systems and computer communication networks enhanced by video disc and interactive television will make it economically feasible for people in any part of the country to communicate with one another and with large, shared data bases. Without technology, education is limited to local resources. Information technology offers ways of providing everyone with the best resources. What functional and organizational implications will these developments have for diffusion of change?

BUDGETARY ALLOCATIONS

Schools are used to a pattern of big spending on people and buildings and austere economy on everything else. Educational administrators may have to change their economic philosophy in order to take advantage of information technology effectively. With anticipated budget cuts for education, will there be enough revenue available to undertake the needed initiatives?

HEALTH

How much do we know about the physical effects (for example, eye strain) inolved in long use of computers? How will computers be used and how long will users be expected to use them at one time?

LIAISON RELATIONSHIPS WITH PUBLIC AND PRIVATE SECTORS

Collaboration with business, industry and parent groups will become increasingly more important as computers enter the job and home environment. Education will become a lifelong experience because of the changes that will be brought about by technology. Computers will become the pedagogical tools of the future. How will the schools provide guidance to parents in the use of the computer? What are the implications for coordinating school and home study efforts? Coordinating school and business efforts?

LITERACY GAP

It is evident that industry is aiming itself much more to the home market than to the school. The proliferation of microprocessor toys and video

games are helping to create a technology-oriented generation that is not intimidated by computers. How can teachers and administrators be trained fast enough to keep up with their students? To what extent can computer literacy be promoted in view of the limited amount of hardware available in the schools?

## COURSEWARE DEVELOPMENT SYSTEMS

The availability of an authoring language for the microcomputer selected is critical. Most teachers and curriculum specialists do not have programming skills. They need an opportunity to develop their own courseware, using a structured program (e.g, GENIS), which does not require knowledge of computer programming. How can this development be coordinated? How can the exchange of teacher-prepared courseware be facilitated?

## COURSEWARE IDENTIFICATION, SELECTION, AND EVALUATION

Many of the packages available have been created by programmers who have little knowledge of educational theory or practice. It is difficult to find what packages are available and even more difficult to find high quality materials. How should courseware be selected and evaluated when educators do not know what criteria should be used to measure its effectiveness? To what extent should quality controls (similar to textbook adoption criteria) be specified?

Educators responsible for obtaining courseware should do as many of the following as possible:

- get access to software in advance of purchase, at no charge, for preview and evaluation;
- know which reviews are reliable;
- find out about copyright laws which relate to courseware reproduction;
- try to determine how appropriate the courseware is to your school's needs;
- determine if the courseware will adapt to the capabilities of your micro;

- determine what security is necessary to keep your hardware and software safe;
- develop a management and record keeping system for your software;
- consider to what extent your hardware and software will remain useful, not go out of date;
- locate state and regional resources for additional technical assistance.

Several attributes are essential to consider in the design of courseware:

1) Curriculum Role
   - supplementary or "adjunct"
   - basic course or "mainline"
   - management only
   - other, i.e. authoring, programming, assessment

2) Mode of Interaction
   - drill & practice
   - tutorial
   - gaming
   - simulation
   - problem solving
   - exploration

3) Student Sequence
   - nonlinear
   - control over sequence

4) Instructional Text Format

5) Graphics
   - embedded in instructional content (integral part of instruction); optimal way to use; presents a visual model of what is to be learned; enhances retention; facilitates recall.
   - used for enhancement

6) Cues and/or Prompts - techniques to stimulate recall before a response is given

7) Action on the Screen

8) User Control Over:
   - amount of time allowed for solving the problem;
   - rate that display material is presented so user can read information at own pace;
   - choice of sequence so user not confined to linear path;
   - where entry into program must begin;
   - exiting an activity at any time;
   - options such as HELP, ESCAPE, HINT keys

9) Computer-Managed Instruction (CMI)
   - collect and store data
   - prescribe
   - report
   - branching - part of diagnostic management

10) Feedback
   - Research says the main function of feedback is not to strengthen or reinforce correct responses, but to locate errors and provide information so learner can get them right. Providing only positive feedback is less facilitative during acquisition of instruction than giving negative feedback. Feedback should be used after wrong responses and can be redundant and unnecessary after correct responses. Intermittent or partial reinforcement schedule maintains the highest rate of learning. Not only is it unnecessary to reinforce each response, it is preferable not to do so.
   - Appropriate use of feedback:
     - non-threatening
     - immediate and informs what correct response is
     - does not over-reinforce correct responses
     - should remediate
     - does not reinforce wrong responses
     - should be relevant for user's age and level

11) Records Stored on Magnetic Devices

12) Frame Display

13) Content Designed to be Altered

14) Random Generation

15) Packaging

STAFF TRAINING

Teachers who are unfamiliar with technology will experience difficulty in integrating the computer into the classroom. Training in the use of computers requires extensive inservice. Since there are few people with this kind of expertise, who will conduct the training?

There are only a few universities which offer courses in computer literacy training for educators. State Education Agencies need to encourage the development of such courses.

The use of the computer in education should be incorporated in existing preservice teacher coursework such as the basic media utilization course available at most colleges of education. It would be beneficial if such a course were mandatory for teacher certification.

Teacher training about computers needs to be approached carefully:

- Teachers need to be persuaded to the fact that computers are indeed educational tools and are worthy of study.
- Teachers need to feed that they are not alone in their ignorance.
- Teachers must realize that they do not need to be technicians or computer scientists to use or teach about computers.
- Training needs to begin with programs that will aid the teacher directly. For example, text editing programs, grade book, and instructional material generation programs.
- Be practical about information: provide teachers with resource materials that will help them put together a curriculum. Identify resources such as books, films, filmstrips, magazines that will help teach computer literacy skills.
- Teachers do not need to know how to program in BASIC unless they plan to teach programming to students. More importantly, they need to know what the computer can and can't do in terms of instruction.

- Teachers do need to know what software is available and how to determine its quality.

- Educators, when spoken to in a group (i.e., by a "keynote speaker") must see actual demonstrations of "up and running" equipment. By now they've heard the old "bandwagon" speeches, and are, as a group, beginning to doubt that the computer can really do all that folks claim it can. This problem is most likely a result of the software support problems we've experienced in the past. Speakers talked about hardware capabilities, but lacked software to support their claims. We need to demonstrate that this is changing as software becomes available.

- The trainer must be careful about the language he/she uses in training sessions. "Computerese" is a language most educators don't yet speak, and highly technical vocabulary will intimidate them. By the same token, talking down to teachers and assuming they know absolutely nothing about computers can be viewed as demeaning and insulting.

- The trainer needs to be cognizant of the fact that not all teachers require the same degree of training, and sessions should be planned with this in mind. Teaching computer mathematics in high school requires a very different set of skills from those required to run a science simulation with fifth graders. In other words, training needs are tied directly to level of use.

- Teachers must be shown that the computer can be used to assist them, and is not just one more thing to hassle with. As TIME magazine said, we expect of schools what we used to expect of God. They must be shown the CAI is not in the same category as grade reports, lunch duty, and parent conferences. (Note: The materials generation programs from MECC are helpful to support the "teacher's assistance" notion.)

- Many teachers are machine anxious and require actual de-sensitization. Some must be reinforced for even turning toward the keyboard. This means that the trainer must be highly sensitive to the

teachers' emotional reaction to the experience of confronting the computer and must structure the training in a supportive, non-threatening atmosphere.

- In "hands-on" training (a requirement of all but awareness sessions), educators must experience some degree of success in at most 30 minutes. If not, they become frustrated and have a difficult time progressing. Trainers should begin with short, simple experiences and proceed to more complex examples only after initial success has been achieved. All adults must have a way of saving face, and it's helpful to have programming assignments, for example, which have sample solutions on the back.

- If individualized work is done in a session (i.e., Jim Poirot's excellent disketts which teach BASIC), it should be preceded by some group instruction. Most adults feel comfortable with group instruction, since our previous learning experiences typically began that way. When participants do begin to work independently, the trainer(s) must remain close at hand (at least initially) to help if there are questions. It can be terribly frustrating for a teacher to interact with a program, run into a problem, and have no human to ask for help.

- The trainer(s) must avoid the temptation to pack too much information into too short a time frame. We can only expect folks to assimilate a certain amount of information at a time. They must be given time to practice new notions and adapt those notions to personal needs.

- Educators should be given honest information about the technology and the promise of the future. They should not be led to believe that the computer is some sort of panacea which will cure all ills in education. Rather, they should be given realistic ideas about the technology and its impact on instruction, administration, and management.

# TWO APPROACHES TO SOFTWARE EVALUATION: EPIE AND MICROSIFT

EPIE Institute

PO Box 620 Stony Brook, N.Y. 11790 516-246-8664 Nonprofit • Consumer Supported • Unbiased



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## Analysis of Microcomputer Instructional Software

Project Fact Sheet

The Educational Products Information Exchange Institute (EPIE) has, for many years, provided objective analyses of textbooks and other materials used in elementary and high schools. These analyses have been used by numerous schools in the United States and Canada and have been an important component in the process of materials selection. Now, with the advent of new technology and materials in the classroom, such as the microcomputer and its software, it is essential that a process similar to that used in the analysis and selection of conventional classroom materials also be applied to microcomputer software designed for classroom use.

With partial foundation support the EPIE Institute and the Microcomputer Resource Center (MRC) at Teachers College, Columbia University have begun a project which will systematically analyse microcomputer software specifically designed for school use. Adapted by Vicki Blum of Teachers College from the EPIE Institute's instructional materials analysis instrument, the software analysis instrument will analyse software in terms of the developer's rationale, learning objectives, content, instructional strategies and recommended methodology in using the materials, and the evaluation and testing component built into the software. The analysis will examine the degree of agreement between the intents, contents, methodology and evaluation components to determine the nature of the program's overall instructional design.

Analysis of microcomputer software will be available in the Summer of 1981 and will be updated as new products are marketed.

For further information call (212) 678 3740 or contact the EPIE Institute office listed above.

EPIE Institute Executive Director : P Kenneth Komoski
MRC Director : Karen Billings

SS

GLOSSARY of TERMS

MICROCOMPUTER COURSEWARE EVALUATION INSTRUMENT

General Definitions:

Computer-assisted instruction (CAI): An interaction between a student controlled display, and a response-entry device for the purpose of achieving educational outcomes.

Hardware: Equipment, including computers, disk drives, cassette players, cables, monitors.

Software: Computer programs and data, including application programs, operating systems, and languages.

Courseware: The software and all the supplementary print materials that constitute a complete course of study. Thus, a courseware package might include a magnetic tape or floppy disk and also a videotape, a set of microfiche cards, and most commonly, a set of printed materials.

Microcomputer: Refers to a computer that costs roughly $200 to $6000 with the major computational capabilities concentrated in one electronic component called a "chip." Generally, it can not only do computations but can also communicate with terminals and store relatively large quantities of data. The functional components are the same as a larger computer system which includes: input, memory, output, and central processing unit (CPU). Memory usually ranges from 4K (enough space to store about 4,000 characters) to 64K (about 64,000 characters). The commonly available language is BASIC.

I.D. Program Application:

Curriculum Role:

Supplementary/Adjunct: Those applications of computers used by teachers as supplements to their regularly scheduled courses. Problem solving, simulation, games and drill and practice are all examples of adjunct applications of the computer.

Basic Course/Mainline: Those applications of computers used by teachers as a complete system to teach; it is where a complete course is taught to students via the computer.

Management Only: An application where only the management of instruction is handled by the computer. It provides automated data collection, data processing and reporting capability to cope with the time-consuming demands of individualized instruction. No instructional mode is provided in this application.

I. Mode of Instruction:

Drill and practice: Designed to supplement regular instruction elsewhere by providing a means by which concepts presented and developed in the classroom can be practiced and refined at the computer.

Tutorial: Intended to stand alone as an instructional entity; teaches rules and concepts embodied in the subject matter as well as evaluating the student's comprehension of these concepts.

Game: A situation where students have to know certain facts, perform certain skills, or demonstrate mastery of certain concepts; winning depends upon mastery of these cognitive skills.

Simulation: The dynamic execution or manipulation of a model of some object system so that the student can intereact with and become part of that simulated reality.

Problem-solving: The finding of solutions to novel problems that should be carefully distinguished from the routine substitution of numerical values in mathematical expressions of the same type--a kind of "drill." It involves the combining of previously learned rules into a new higher-order rule, which "solves" the problem and generalizes to an entire class of stimulus situations embodying other problems of the same type.

Exploratory mode: A higher order approach synthesizing many problem-solving skills into one creative endeavor, unstructured and exploratory in its methodology to learning.

II. Intents: The rationale, the goals, and the objectives of the intended instruction.

Behavioral Objective: A complete behavioral objective indicates: 1) what the student should be able to do in terms of a behavior, 2) the conditions under which the behavior is to occur, and 3) an acceptable standard of performance for the behavior. An example of one is: Given ten additional problems on the microcomputer that use single digit numbers and no carrying, the student will be able to solve them with 95% accuracy.

Higher order skills: The work of Bloom (1956) has attempted to arrange behavioral objectives along a continuum from simple to complex, forming a taxonomy of educational objectives. As the taxonomy is organized, it contains six major classes in which objectives can be expressed, ranging from the simplest rote-recall level to the highest level of evaluating theories. This taxonomy has been most useful to educators in helping them assess the level at which the program's objectives are located, whether most objectives fall at the lowest level of recall or are striving toward the higher order skills of comprehension, application, analysis, synthesis and evaluation.

III. Contents: The scope and sequence of the subject matter to be included, and the learning activities to be presented.

Scope: The width of the total subject matter or skills to be introduced, or covered, in pursuit of goals and objectives; all the topics to be covered.

Range: The extent or depth of coverage of each topic.

Advanced organizers: Designed to provide a conceptual framework that students can use to clarify the task ahead. Based upon the work of Ausubel, advanced organizers emphasize the process of learning or the context in which the learner interacts with the subject matter, while other preinstructional strategies concentrate upon the product or subject matter content.

Concept: The class or category all members of which share a particular combination of critical properties not shared by any other class.

Non-example: A learner who has grasped a concept should be able to discriminate examples of the concept from non-examples. This means that a person should be able to discriminate any member of the class "chair" from non-members. All chairs must have both a single-person seat and a back support. Objects sharing the property of backs but designed for more than one person are not chairs; seats without backs are also excluded from the class of chairs. To ensure that the learner knows the difference, both examples from the class chair and non-examples must be used in instruction.

Cues/prompts: Events which provide cues for the enhancement of recall. A form of learning guidance in which the cues are eliminated in a step-by-step fashion. Example: If "trap" is the correct response, a succession of prompts to enhance recall might be "_ rap," "_ _ ap," and "_ _ _ p."

IV. Methodology: The teaching/learning transactions or methods which are to be employed in an instructional material.

V. Means of Evaluation: The approaches to assessment and evaluation of learning outcomes which are provided, or at least suggested in an instructional material.

Computer-Managed Instruction: A total computer system designed to facilitate management of individualized instruction. The system provides: 1) data collection, 2) diagnosis of the student's performance, 3) prescription by varying the level of difficulty as a result of performance, and 4) reports of the student's progress. An instructional mode is included in this system.

Feedback: The message or compound statement which follows the response made by the learner.

VI. Congruence: The "fit" between the four constructs (Intents, Contents, Methodology, and Means of Evaluation) so that the material is tight and well-designed. For example, does the scope of the contents fulfill the rationale offered by the developer? Do the components of the evaluation system dependably assess whether the learner has realized the objectives? If each construct mutually supports and facilitates the other three constructs then there is congruence. If one construct is lacking or weak in one area, then congruence in that particular construct is missing.

VII. Random Generation: The ability of the computer to generate data randomly. For example, each time a set of addition problems are given, the computer will randomly display them so that the student will never get the same problems in the exact same order each time he/she goes through the exercise.

Analyst Name_____ Date_____19____

## I. IDENTIFICATION AND BACKGROUND

### A. Bibliographic Information

1. Title:_____
2. Authors:_____
3. Manufacturer or Publisher:_____
4. Address:_____
5. Copyright Date(s) (if no date, specify):_____
6. Cost:_____
7. Available for what microcomputer(s) (model and memory):_____

_____

### B. Components

A Teacher's Guide for the whole program ____ is included
____ is not included

| Grade Level | Title | Cassette | Disk | Module | Separate Tchr's Guide |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
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| | | | | | |

*Indicates not available for analysis

C Support Related Materials

Give title, type of medium (print, video, audio cassette, film, etc.), producer/source, and role they play in the program.

| Title | Medium | Producer | Role in program (e.g., required or supplementary |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

D. Program Application

1. Subject Area(s): _____

2. Curriculum Role:
   - ____ Supplementary/Adjunct
   - ____ Basic Course/Mainline
   - ____ Management Only
   - ____ Other _____

3. Mode of interaction (check as many as apply):
   - ____ Drill and practice
   - ____ Tutorial
   - ____ Gaming
   - ____ Simulation
   - ____ Problem Solving
   - ____ Exploration

E. Program Users

1. Intended Users: _____
   - ____ Specified in materials
   - ____ Specified in Teacher's Guide
   - ____ Inferred

2. Learner Entry Competencies: _____
   - ____ No special competencies required
   - ____ Competencies required but not specified
   - ____ Special competencies specified in: _____

3. Target Audience that the Analyst feels program should be utilized for:
   - ____ same as specified in materials
   - ____ different than specified in materials:

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## II. INTENTS

### A. Developer's Rationale

1. ____ Specified by developer ____ Inferred by analyst
2. Source: _____

Rationale: _____ (Check as many as apply):

_____
_____ ____ Develop skills in particular area
_____ ____ Present concepts and principles
_____ ____ Supplement other resources
_____ ____ Apply specific instructional approach
_____ ____ Serve special group of learners
_____ ____ Introduce subject matter content in
_____ a unique or specific way.
_____ ____ Other: _____

### B. Learner Objectives

1. ___ Specified by developer ____ Inferred by analyst

Source: _____

2. Example of Objectives: _____
_____

Major emphasis of objectives are: (Check as many as apply):

_____
_____ ____ Recall of previously learned facts
_____ ____ Application of specific skill(s)
_____ ____ Abstraction beyond concrete level
_____ ____ Transfer of learning (i.e., to
_____ real life situations)
_____ ____ Critical thinking skills
_____ ____ Create specific feelings and
_____ attitudes
_____ ____ Develop study skills
_____ ____ Other: _____

### C. Instructional Strategies

| | Always Present | Sometimes Present | Never Present |
|---|---|---|---|
| 1. Objectives are stated behaviorally. Comments: _____ _____ | ___ | ___ | ___ |
| 2. Objectives are stated in terms of the learner. Comments: _____ _____ | ___ | ___ | ___ |
| 3. Objectives include higher order skills such as comprehension, application, analysis, synthesis, and evaluation. Comments: _____ _____ | ___ | ___ | ___ |
| 4. Learners are informed of the objectives. Comments: _____ | ___ | ___ | ___ |

## III. CONTENTS

### A. Content Scope

1. Topics Covered (list main topic(s), theme(s), units covered):

_____

_____

| | Yes | No |
|---|---|---|
| 2. Range of content material is adequate to achieve program's intents. | ____ | ____ |
| 3. Scope is appropriate for learning levels of intended users. | ____ | ____ |

### B. Content Sequence

1. ____ Specified by developer ____ Inferred by analyst

2. Source: ____ Documentation ____ Teacher's Manual
   ____ Catalogue ____ Other:_____

   If specified, briefly describe sequence of content:_____

   _____

   _____

3. Total program sequence: (Check as many as apply)

   Comments:_____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   ____ Chronological
   ____ Unit (natural unit in subject matter)
   ____ Problem-centered
   ____ Descriptive
   ____ Task Analysis (breaking task into parts and teaching progressively harder steps)
   ____ Dictated by learning approach (i.e., simulation, game)
   ____ Other_____

4. Student sequence through the total program:

   Comments:_____

   _____

   _____

| | Yes | No |
|---|---|---|
| Is set by program | ____ | ____ |
| Is set by teacher | ____ | ____ |
| Is left to user | ____ | ____ |

5. Students' entry into and out of an activity:

   Comments:_____

   _____

   _____

   _____

   _____

   _____

   _____

| | Yes | No |
|---|---|---|
| Is fixed by program in set sequence and user must continue through whole sequence | ____ | ____ |
| Can be varied by user | ____ | ____ |
| Can be varied by teacher | ____ | ____ |

C. Preinstructional Strategies

| | Always Present | Sometimes Present | Never Present |
|---|---|---|---|
| 1. Pretests are used. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| 2. Advanced organizers such as pre-questions, overviews, and summaries are used. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| 3. Clear and concise title is presented at the beginning of each unit in the program. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |

D. Instructional Strategies

| | | | |
|---|---|---|---|
| Instructional Text Format: | | | |
| 1. Information is formatted for easy reading. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| 2. Labels or headings identify different kinds of information. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| 3. Sentence structure is easily understood for user population (i.e., sentences aren't too long or too short). | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| Concept Learning: | | | |
| 4. The program uses a number of examples to teach each concept. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |

| | Always Present | Sometimes Present | Never Present |
|---|---|---|---|
| **Concept Learning:** | | | |
| 5. The program uses a number of nonexamples to teach each concept. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| 6. Practice in varied contexts is provided. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| **Enhancing Retention:** | | | |
| 7. Vocabulary is appropriate for the user. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| 8. When used, graphics are: | | | |
| a. embedded in the instuctional content (i.e., are an essential part of instruction) | ___ | ___ | ___ |
| b. used for enhancement only (i.e., are not part of the content but used to enhance presentation or feedback) | ___ | ___ | ___ |
| 9. Graphics are used appropriately: | | | |
| a. are relevant for user's age and level | ___ | ___ | ___ |
| b. are not distracting | ___ | ___ | ___ |
| c. support program's intents | ___ | ___ | ___ |
| 10. Cues and/or prompts are used after wrong response. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| 11. Action occurs on the screen (i.e., there is graphic movement other than just words; specify if used in content, feedback only, or both). | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |
| 12. A demonstration of the exercise is given. | | | |
| Comments: _____ | ___ | ___ | ___ |
| _____ | | | |

## IV. METHODOLOGY

### A. Presentation

1. Methods for using the materials are:

   _____ Specified by developer _____ Left to user ____ Left to Teacher

2. Source: _____ Teacher's Guide or instructional suggestions

   _____ Directions in program _____ Other:_____

### B. Instructional Approach

1. Briefly describe the instructional approach used in organizing the activities of this program (i.e., what does a teacher and/or student have to do to progress through a unit?).

### C. Teacher Use

1. Teacher Training:

   Comments:

   _____ Is specified

   _____ Is not mentioned

2. Teacher Use/Guidance:

   Comments:

   _____ Inservice Training

   _____ Lesson plans in Teacher Guide

   _____ General suggestions in Teacher's Guide

   _____ No guidance provided

D. Teacher's Manual

1. _____ Is provided _____ Is not provided

| | Yes | No |
|---|---|---|
| 2. Content provides: | | |
| Enough information to familiarize teacher with technical use of program | ___ | ___ |
| Classroom strategies for use of program | ___ | ___ |
| Instructional activities to integrate program into curriculum | ___ | ___ |
| 3. Instructions: | | |
| Are well organized | ___ | ___ |
| Are clearly stated | ___ | ___ |
| Provide step-by-step approach | ___ | ___ |

Comments: _____

E. Instructional Strategies

| | Always Present | Sometimes Present | Never Present |
|---|---|---|---|
| 1. Instructions in the program for the student are easily understood. | ___ | ___ | ___ |
| 2. Instructions in the program for the student are concise. | ___ | ___ | ___ |
| 3. Please consider the extent to which the user can control the rate and sequence of presentation over: | | | |
| a. amount of time allowed for solving the problem (i.e., can user choose how many seconds each problem is presented) | ___ | ___ | ___ |
| b. rate that display material is presented so user can read information at own pace | ___ | ___ | ___ |
| c. choice of sequence so user is not confined to linear path | ___ | ___ | ___ |
| d. where entry into program must begin | ___ | ___ | ___ |
| e. exiting an activity at any time | ___ | ___ | ___ |
| f. reviewing instructions | ___ | ___ | ___ |
| g. options available in sequence such as "HELP," "HINT," "ESCAPE" keys | ___ | ___ | ___ |

Comments: _____

## V. MEANS OF EVALUATION

### A. Management System/Tests

1. Computer-Managed Instruction (i.e., management of the student's performance is done by the computer)
   - _____ is used by the program
   - _____ is not used by the program

2. The following functions are implemented by the computer-management system:
   - _____ Data collection and storage from the learning situation
   - _____ Diagnosis (i.e., computer determines the status of student's observed performance)
   - _____ Prescription based upon student data (i.e., computer moves a student forward to the next unit or assigns a student activities to eliminate a deficiency)
   - _____ Reporting

3. Tests
   - _____ are included in the program
   - _____ are supplementary print materials
   - _____ are not included

4. Tests are specified to be used as: (Check as many as apply)
   - _____ Pretest(s)
   - _____ Unit test(s)
   - _____ Diagnostic test(s)
   - _____ Mastery test(s)
   - _____ Other:_____

Comments:_____

_____

_____

_____

### B. Instructional Strategies

| | Always Present | Sometimes Present | Never Present |
|---|---|---|---|
| 1. a) Feedback is used after correct responses only. | ____ | ____ | ____ |
| b) Feedback is used after incorrect responses only. | ____ | ____ | ____ |
| c) Feedback is used after both kinds of responses. | ____ | ____ | ____ |
| 2. Feedback explains why the response is wrong. | ____ | ____ | ____ |

Comments:_____

_____

_____

| | Always Present | Sometimes Present | Never Present |
|---|---|---|---|
| 3. Feedback informs what the correct response is after _____ wrong attempts. | ____ | ____ | ____ |
| Comments:_____ | | | |
| 4. Feedback responses are varied: | | | |
| a) from activity to activity. | ____ | ____ | ____ |
| b) within each activity. | ____ | ____ | ____ |
| Comments:_____ | | | |
| 5. Feedback uses: a) graphics | ____ | ____ | ____ |
| b) printed words | ____ | ____ | ____ |
| c) audio output | ____ | ____ | ____ |
| Comments:_____ | | | |
| 6. Feedback is used appropriately: | | | |
| a) it is non-threatening | ____ | ____ | ____ |
| b) it is immediate | ____ | ____ | ____ |
| c) it doesn't over-reinforce correct responses | ____ | ____ | ____ |
| d) it remediates | ____ | ____ | ____ |
| e) it doesn't reinforce wrong responses | ____ | ____ | ____ |
| f) it is relevant for user's age and level | ____ | ____ | ____ |
| Comments:_____ | | | |
| 7. If records exist, they are informative. | ____ | ____ | ____ |
| Comments:_____ | | | |
| 8. Records are easily accessible by teacher. | ____ | ____ | ____ |
| Comments:_____ | | | |
| 9. Cumulative records for each student: | | | |
| a) are stored in memory for future retrieval. | ____ | ____ | ____ |
| b) are to be manually stored on printed sheets provided in the Guide | ____ | ____ | ____ |
| Comments:_____ | | | |

## VI. INSTRUCTIONAL DESIGN CONGRUENCE

A. Instructional Design Provisions

| | YES | NO |
|---|---|---|
| 1. Intents match content | ___ | ___ |
| 2. Intents match methodology | ___ | ___ |
| 3. Intents match means of evaluation | ___ | ___ |
| 4. Content matches methodology | ___ | ___ |
| 5. Content matches means of evaluation | ___ | ___ |
| 6. Methodology matches means of evaluation | ___ | ___ |

Comments: _____

## VII. USE CONSIDERATIONS

A. Technical Considerations

| | | Always Present | Sometimes Present | Never Present |
|---|---|---|---|---|
| 1. Graphics: | | | | |
| Comments: _____ | Have clear resolution | ___ | ___ | ___ |
| | Are in color | ___ | ___ | ___ |
| | Are presented clearly for maximum understanding | ___ | ___ | ___ |
| 2. Audio Output: | | | | |
| Comments: _____ | Is clear | ___ | ___ | ___ |
| | Is realistic | ___ | ___ | ___ |
| | Contributes to program's value | ___ | ___ | ___ |
| 3. Frame Display: | | | | |
| Comments: _____ | Is clear of clutter | ___ | ___ | ___ |
| | Is formatted for easy reading | ___ | ___ | ___ |
| | Is cleared before each new display | ___ | ___ | ___ |
| 4. Program Content: | | | | |
| Comments: _____ | Is designed to be altered by teacher adding to it | ___ | ___ | ___ |
| | Is designed to be altered by student adding to it | ___ | ___ | ___ |
| | Is technically easy to utilize in computer | ___ | ___ | ___ |

| | | Always Present | Sometimes Present | Never Present |
|---|---|---|---|---|
| 5. Random Generation: | | | | |
| Comments: _____ | Is used in practice activities | ___ | ___ | ___ |
| | Is used in feedback | ___ | ___ | ___ |
| 6. Tapes/Disks are accurate in: | | | | |
| Comments: _____ | Spelling | ___ | ___ | ___ |
| | Grammar | ___ | ___ | ___ |
| | Word Usage | ___ | ___ | ___ |
| 7. Packaging of the program: | | | | |
| Comments: _____ | Is well-designed for component parts | ___ | ___ | ___ |
| | Contains an Instructor's Guide | ___ | ___ | ___ |
| 8. The writing style: | | | | |
| Comments: _____ | Is appropriate for user population (i.e., not too mechanical, cute, patronizing, etc.) | ___ | ___ | ___ |
| 9. Content: | | | | |
| Comments: _____ | Is accurate | ___ | ___ | ___ |
| | Is free of sexual bias | ___ | ___ | ___ |
| | Is free of racial bias | ___ | ___ | ___ |
| | Is free of ethnic bias | ___ | ___ | ___ |
| 10. Design of program: | | | | |
| Comments: _____ | Is organized in a consistent fashion across different units (i.e., Is the structure of an addition unit parallel to the structure of other units in the program?) | ___ | ___ | ___ |
| 11. Technical design of program: | | | | |
| Comments: _____ | Allows for quick response time on the computer (i.e., the computer responds quickly once the keys are depressed) | ___ | ___ | ___ |
| | Allows for quick loading of the program (i.e., a lot of time isn't spent waiting for parts of the program to be loaded in memory | ___ | ___ | ___ |

B. Development

1. _____ Program has been field-tested.
2. _____ Documentation of Learner-Verification and Revision is provided.
3. _____ No documentation of development and/or research has been provided.

Comments: _____

SUMMARY STATEMENT

Please comment on the following in your summary statement: the beneficial points of this program, specific improvements and recommendations the developer could attend to, if the program utilized the unique capabilities of the computer, and your intuitive feelings regarding the overall quality of the program.

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# MicroSIFT: A CLEARINGHOUSE FOR EDUCATIONAL APPLICATIONS OF MICROCOMPUTERS

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A clearinghouse for microcomputer instructional software and teacher information has been established at Northwest Regional Educational Laboratory (NWREL) under a contract with the National Institute of Education. The clearinghouse, MicroSIFT (Microcomputer Software and Information for Teachers) is a central project of NWREL's Computer Technology Program. The Program has been productively involved in developing methods and materials for the use of computers in education for more than a decade. The key objectives of the MicroSIFT clearinghouse are:

1. To develop and implement a model for the dissemination of microcomputer software, information, and materials for educational use at K-12 levels.
2. To develop, validate, and implement an evaluation model suitable for computer-based instructional packages. The model will include support of the long-term assessment of the quality of materials proposed for distribution.
3. To develop and implement a user support and technical assistance program in the Northwest region, which will increase the capability of local and state education agencies to choose and implement microcomputer applications in education.
4. To develop and implement a feedforward model for guiding and directing development of new computer-based instructional materials.

The scope of the project includes both instructional and administrative applications for education. The initial focus of staff efforts has been on instructional applications because of the high interest and available packages in that area. The project has also been collecting information on non-instructional software, and will be examining possible approaches to evaluating those materials during 1981-1982.

## ORGANIZATIONAL BASE

Established educational institutions and consortia will be the major initial mechanism for the collection, evaluation and dissemination activities of MicroSIFT. A network of organizations has been established consisting of existing computer centers which serve a large number of schools and provide significant work in instructional applications of computers. Their personnel are experienced in computer-based education and in dealing with the technical problems involved in program transfer. Such centers have a need to evaluate the efficacy of instructional software. Many have done evaluations on a small scale, but are not able to support large-scare continuous evaluation efforts.

The Network is being established in two stages. In the first stage, a selected set of 12 centers was enlisted as initial members. They were chosen because they had several years of involvement in instructional computing, including development and evaluation of computer-based materials, provision of inservice for teachers, support of microcomputer implementation in schools, and having full-time instructional computing staff members.

The second stage of the network involved the addition of 12 more member institutions using the same criteria and a consideration of geographic distribution.

The MicroSIFT Network will be the major vehicle for the evaluation process and the source of reviewers and test sites. The centers offer access to experienced and beginning users, qualified summary reviewers, a variety of student groups, geographic locations, and ethnic, minority and socio-economic groups. They are experienced in evaluation of computer-based materials, and almost any desired hardware base can be found in use among them.

## EVALUATION MODEL

Many individuals, small and large publishing companies, and hardware manufacturers are producing programs and materials for microcomputer applications. A primary need of the educational consumer surveying those products is a basis for assessing educational value and utility. The basis for good evaluation of materials is the existence of a well defined process supported by usable instruments validated for the environment of their intended use. A primary concern of MicroSIFT to date, in line with the second objective, has been the development of such a process and instruments uniquely suited to microcomputer-based instructional materials. MicroSIFT staff were joined in this effort by the Program for Research on Evaluation of NWREL, which is exploring new evaluation techniques and environments.

Sample instruments (checklists, questionnaires, rating scales) used by schools, regional service centers, microcomputer publications and individuals were collected and analyzed. The CONDUIT evaluation procedure and instruments weighed heavily in the initial design. Discussions with organizations having significant experience in the instructional application of computers in the K-12 environment also contributed substantially to the development of this evaluation model.

An EVALUATOR'S GUIDE was developed to assist evaluators in interpreting and applying the criteria statements in the evaluation form.

The evaluation process applied to a microcomputer package (program and related materials) is as follows. A package is identified which is designed for instruction, is complete with supporting documentation, and operates with little or no alteration on a standard microcomputer. Factual descriptive information is collected and recorded on a form. A network site is identified to carry out the evaluation. Staff at the network site

choose at least two teachers at the subject and level of the package to test and evaluate the package. A summary review is completed by a person at the network member site who is experienced in the development and use of computer-based instructional materials. In some cases, if more than one member is involved, the summary is completed by MicroSIFT staff.

## FEEDFORWARD MODEL

The process of identification of needed materials is to operate on both the general and specific levels. At the general level, areas of curriculum will be identified which have high potential for employing microcomputer materials successfully, and which are not currently well served with such materials. Much of this information will come from the members of the MicroSIFT Network. Solicitations also will be made through the newsletter, and by direct letter to publishers. At the specific level, programs or packages will be specified to support student learning at a particular point in a course to meet a certain objective. This will involve the design of forms and the provision of processes for distribution and return. It is anticipated that in many cases, ideas for needed development will come from individual teachers who are involved in microcomputer use.

A publication entitled the DEVELOPER'S ADVISORY will be produced which will include both general and specific development needs as identified by the processes above. The ADVISORY will be disseminated through the avenues described under "Dissemination," and by direct mail to a list of publishers and other developers assembled by MicroSIFT staff.

## DISSEMINATION

Information concerning clearinghouse plans, activities, progress, services, and outputs will be made available in several ways. One of the primary avenues is the expanding general dissemination capacity being directly supported by NIE: Regional Exchanges, Regional Service Programs and State Capacity Building Programs. The CEDaR COMMENTS and EDUCATIONAL R&D REPORT, publications of the Council for Educational Development and Research, will be used for spread of information to the readers of those publications. A newsletter, MICROSIFT NEWS, has been established to facilitate spread of information through direct mail contact with a continually growing mailing list. News releases and articles will be prepared for publication in professional magazines which are specifically aimed at the educational computing community. Publication of reviews will be on a quarterly basis, although permanent avenues for their publication have not been determined.

Northwest Regional Educational Laboratory

# COURSEWARE EVALUATION PROCESS OVERVIEW

microSIFT

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The process described here was designed during the 1980-81 school year as a framework for the evaluation of microcomputer-based instructional materials by the MicroSIFT clearinghouse. The components are a set of forms, the Evaluator's Guide, and a network of educational institutions.

The forms were based originally on the forms developed and used by the CONDUIT Project for evaluating computer-based instructional packages for post-secondary institutions. They were modified with additional concepts adopted from forms developed by the organizations and individuals. The "Courseware Description" form identifies the factual information necessary for evaluation and use of a package, including source, ability level, subject, mode of instruction, required hardware and software, instructional objectives and prerequisites. The "Courseware Evaluation" form is designed to be used after the information on the Description form is available. A copy of the rating portion is on the reverse of this page. In addition, it provides space for identifying major strengths and weaknesses, and suggestions for potential classroom uses.

The Evaluator's Guide is a book designed to be used by teachers and others who are evaluating courseware for MicroSIFT. It describes the use of the Description and Evaluation forms, and provides guidelines, suggestions and interpretations of each item on the Evaluation form.

The microSIFT Network is a group of over 20 educational organizations serving elementary and secondary schools with computer services and other types of support. The network includes school districts, regional service centers, state departments and state consortia which have experience in serving local districts with inservice, software, computer time and services, curriculum materials and evaluation services. They have staff whose time is assigned to supporting the instructional computing activities of schools in their geographic area.

The components above are used in the three stages of the process described below:

1. Sifting - This is a first look at a package to determine that it is instructional in nature, will actually operate without problems on the appropriate microcomputer, and is complete with instructions. MicroSIFT staff complete this phase of the process.

2. Description - A package passing stage 1 successfully is described in this stage using the Description form discussed above. The producer and MicroSIFT staff complete this stage for the most part. However, some information may be supplied in stage 3.

3. Peer Review - Teachers with experience in the subject and grade or ability level of the material are selected from schools served by a network site to evaluate packages according to the Evaluation form and Evaluator's Guide. A package is identified for a network site by MicroSIFT staff, and the teachers are selected by the instructional computing expert at the site. After the evaluations are completed by the teachers, an evaluation is also done by the network site expert, who also completes a summary review encompassing all three evaluations. The summary review becomes the MicroSIFT evaluation of the package.

Completion of the first three stages takes approximately three months. The resulting evaluations are professional opinions based on experience, and are not necessarily based on observation of student use of the packages. While some do include such use, the evaluators are volunteers, and their time does not always allow for extensive student involvement. Also, a package may be evaluated at a point in the school year not in conjunction with the time the topic is studied.

A fourth stage of evaluation in greater depth is desirable for some packages because of their complexity or breadth of curriculum coverage. Such a stage might include pre- and post-testing, detailed observation of student activity while using a package, or other procedures. This stage is not being implemented by MicroSIFT at this time, although some approaches for it are being developed and investigated.

23. Describe the major strengths of the package:

24. Describe the major weaknesses:





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MICROSIFT COURSEWARE EVALUATION

Package Title _____ Version _____

Reviewer's Name _____ Date _____

25. Describe the potential use of the package in classroom settings.
(NOTE: Complete the centerfold section before completing this item.)

| | RATING: Strongly Agree | Agree | Disagree | Strongly Disagree | Not Applicable | IMPORTANCE (OPT): Higher | Lower | | |
|---|---|---|---|---|---|---|---|---|---|
| CONTENT | SA | A | D | SD | NA | H | L | 1. The content is accurate. | 18 |
| | SA | A | D | SD | NA | H | L | 2. The content has educational value. | 19 |
| | SA | A | D | SD | NA | H | L | 3. The content is free of race, ethnic, sex, and other stereotypes. | 20 |
| INSTRUCTIONAL QUALITY | SA | A | D | SD | NA | H | L | 4. The purpose of the package is well-defined. | 21 |
| | SA | A | D | SD | NA | H | L | 5. The package achieves its defined purpose. | 22 |
| | SA | A | D | SD | NA | H | L | 6. Presentation of content is clear and logical. | 23 |
| | SA | A | D | SD | NA | H | L | 7. The level of difficulty is appropriate for the target audience. | 24 |
| | SA | A | D | SD | NA | H | L | 8. Graphics/color/sound are used for appropriate instructional reasons. | 26 |
| | SA | A | D | SD | NA | H | L | 9. Use of the package is motivational. | 27 |
| | SA | A | D | SD | NA | H | L | 10. The package effectively stimulates student creativity. | 28 |
| | SA | A | D | SD | NA | H | L | 11. Feedback on student responses is effectively employed. | 29 |
| | SA | A | D | SD | NA | H | L | 12. The learner controls the rate and sequence of presentation and review. | 30 |
| | SA | A | D | SD | NA | H | L | 13. Instruction is integrated with previous student experience. | 31 |
| | SA | A | D | SD | NA | H | L | 14. Learning is generalizable to an appropriate range of situations. | 32 |
| TECHNICAL QUALITY | SA | A | D | SD | NA | H | L | 15. The user support materials are comprehensive. | 33 |
| | SA | A | D | SD | NA | H | L | 16. The user support materials are effective. | 36 |
| | SA | A | D | SD | NA | H | L | 17. Information displays are effective. | 38 |
| | SA | A | D | SD | NA | H | L | 18. Intended users can easily and independently operate the program. | 40 |
| | SA | A | D | SD | NA | H | L | 19. Teachers can easily employ the package. | 42 |
| | SA | A | D | SD | NA | H | L | 20. The program appropriately uses relevant computer capabilities. | 43 |
| | SA | A | D | SD | NA | H | L | 21. The program is reliable in normal use. | 45 |

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RATING: Circle the letter abbreviation which best reflects your judgment (use the space following each item for comments).

IMPORTANCE: Circle the letter which reflects your judgment of the relative importance of the item in this evaluation.

☐ Check this box if this evaluation is based partly on your observation of student use of this package.

Evaluator's Guide Page Reference →



22. CHECK ONLY ONE

___ I would use or recommend use of this package with little or no change. (Note suggestions for effective use on the front page.)

___ I would use or recommend use of this package only if certain changes were made. (Note changes under major weaknesses on the next page.)

___ I would not use or recommend this package. (Note reasons under major weaknesses.)

Describe Package Content and Structure:

Describer's Name _____ Date _____



Northwest Regional Educational Laboratory

microSIFT COURSEWARE DESCRIPTION

Package Title _____

Version _____ Cost _____

Producer _____

Subject Area _____ Grade/Ability Level _____

Specific Topic _____

Dewey Decimal _____

Sears Subject Headings _____

ERIC Descriptors _____

---

Medium of Transfer: ____ Tape Cassette ____ 5" Flex. Disk

____ ROM Cartridge ____ 8" Flex. Disk

---

Required Hardware:

---

Required Software:

Type of Package: ____ Single Program ____ Integrated program series component

Instructional Purpose: (Please check all applicable)

____ Remediation ____ Standard Instruction ____ Enrichment

Instructional Techniques: (Please check all applicable descriptions)

| | | |
|---|---|---|
| ____ Drill and Practice | ____ Game | ____ Learning Mgmt. |
| ____ Tutorial | ____ Simulation | ____ Utility |
| ____ Informational Ret. | ____ Problem Solv. | ____ Other |

Documentation Available: (Circle all that are available in the computer program (P) or in the supplementary materials (S)).

| | | | |
|---|---|---|---|
| P S | Suggested grade/ability level(s) | P S | Teacher's information |
| P S | Instructional Objectives | P S | Resource/reference information |
| P S | Prerequisite skills or activities | P S | Student's instructions |
| P S | Sample program output | P S | Student worksheets |
| P S | Program operating instructions | P S | Relationship to standard textbooks |
| P S | Pre-test | P S | Follow-up activities |
| P S | Post-test | P S | Other _____ |

Is listing and alteration of the computer program allowed?



Instructional Objectives: Stated ☐ Inferred ☐

Instructional Prerequisites: Stated ☐ Inferred ☐

FOLD

# COMPUTING COMPETENCIES FOR SCHOOL TEACHERS

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TEACHER EDUCATION

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## Introduction

This paper deals with a subset of the issues and areas related to designing overall, computer-literate teacher training. To appreciate its focus and accept some of its omissions, one should be aware of the following constraints that the task group placed on itself. First, it was unanimously agreed that definitions should be in terms of competencies to be achieved rather than in terms of programs or courses to transmit those competencies. Second because the computing competencies needed by the teacher, who must teach computing as a subject, are more extensive than those needed by other teachers, the competencies needed only by the computing teacher should be treated as a separate module. Third, though integrally related to each other, the competencies needed by the teacher are quite different from those needed by the teacher's teachers, the staff of institutions actually doing the teacher training. It was agreed, therefore, that specifying the competencies needed by the teacher's teacher would be a separate module of work. It was also agreed that it should only be undertaken after competencies needed by the teacher had been specified.

The task group saw the competencies needed by teachers at the school level as all belonging to one of three sets. The first set encompasses those basic universal computing competencies required for any school teaching, regardless of level or subject. The second encompasses those additional computing competencies needed only by the teacher who must teach computing as a subject in its own right. The third encompasses additional computing-related, subject-specific competencies needed by teachers who teach subjects other than computing.

This paper outlines the competencies in all three sets. It incorporates critical suggestions received as a result of wide circulation of two earlier papers on the topic [1,2]. We also trust it will stimulate useful discussion and criticism. We hope it provides some guidance to those wondering what teachers should know about computing.

## Computing Competencies Needed by Teachers

Three sets of computing competencies follow. The first (1.0) includes those which all teachers must have, regardless of their level or discipline, even if that discipline is the teaching of computing itself. The second set (2.0) includes those needed only by the teacher of computing as a subject. It should be noted this second set presupposes the first. The third set (3.0) includes additional competencies for teachers who use computing to support or enhance instruction in subjects other than computing.

### 1.0: Universal Computing Competencies Needed by All Teachers

These are the computing competencies which all school teachers should have to teach effectively in a society permeated by computers.

They relate to either or both of two goals: (1) to understand computing and (2) to use computing. They can be stated partially in terms of competencies listed in ACM's "Curriculum '78" [3] and partially in terms of different competencies, derived from other sources. A number of such other sources are listed in the references at the end of this paper. They reflect the abundance of diverse work that has taken place in the past decade, relating computing to education.

1.1: Competencies

In terms of these universal competencies, every teacher should:

C1.1 be able to read and write simple programs that work correctly and to understand how program and subprograms fit together into systems;
C1.2 have experience using educational application software and documentation;
C1.3 have a working knowledge of computer terminology, particularly as it relates to hardware;
C1.4 know by example, particularly in using computers in education, some types of problems that are and some general types of problems that are not currently amenable to computer solution;
C1.5 be able to identify and use alternate sources of current information on computing as it relates to education;
C1.6 be able to discuss at the level of an intelligent layperson some of the history of computing, particularly as it relates to education; and
C1.7 be able to discuss moral or human-impact issues of computing as they relate to societal use of computers generally, and educational use particularly.

The above competencies should be transmitted within the general preparation programs for all teachers by having those programs include the topics listed below (T1.1 through T1.5). For those being trained to teach computer science, those topics will represent only a small subset of what must be learned about computing and its uses (see Section 2.0). For all other teachers, however, apart from the subject-specific competencies covered in Section 3.0, these topics cover much of what must be learned about computing by the teacher who is to be minimally literate.

1.2: Topics of Study

T1.1 Programming Topics: Includes development of simple algorithms and their implementation in a programming language, programming style, debugging and verification, task-specific programming for educational applications.
T1.2 Computer Terminology: Includes software (e.g., operating systems, time sharing systems, etc.), hardware (e.g., CRT, tape, disk, microcomputers, etc.), and miscellaneous items (e.g., documentation, testing, vendors, etc.).
T1.3 Classic Applications of Computing in Education: Includes representative experience with problem solving and test manipulation, simulation, drill and practice and complex tutorial systems including complete student progress record keeping, and educational administrative systems.
T1.4 Human/Machine Relationships: Includes artificial intelligence, robotics, computer assistance in decision making (e.g., medical, legal, business, etc.), simulations, and computers in fiction.
T1.5 Information on Computers in Education: Includes periodicals, important books, online inquiry sources such as ERIC, professional societies such as ACM, ADS, NCTM, time sharing networks, networks of computer users, and hardware vendor groups.

In T1.1 procedures or algorithms are at the heart of computing so teachers should learn what they are by implementing simple examples such as: a procedure to average a class's grades; a game to guess what number the computer is thinking of; or a procedure to display a large box on the screen and then make it shrink to disappearance.

Teachers need to be able to implement such procedures in only one language, but should be able to read at the same, or a greater, level of difficulty in a second so that the idea of a language, its strength and limitations, springs from personally experiencing functional differences between two languages. Within the limitations of simple programs teachers should be taught to write well structured code, easily readable by others, and to document their code in acceptable fashion.

T1.2 should be integrated throughout the course of study. In order to successfully use computing, the vocabulary of the field must be understood. What is the difference between a tape, a floppy disk, and a

disk? Why use one over the other? These are general ideas, but some minimal understanding of them is necessary to actually use computers.

T1.3 should certainly familiarize the teacher with several of the existing well developed CAI systems cited in Section 3.0 below. Teachers will not develop new ideas about what could be done in their areas unless they see the best of what has been done; neither will they get a full understanding of what can not be reasonably well done by computer without such exposure. For example, acquaintance with the physics system designed by Bork [4], with CCC drill and practice systems based on Suppes's work [5], or with PLATO work [6] should serve to acquaint the teacher with the CAI issues.

Since many teachers end up in administration and since administrative uses of computers affect the teacher, some introduction to one or more representative administrative systems should be included. A student record system would probably be a reasonable choice for illustrative study--it deals with information familiar to the teacher without using financial details some might find difficult to understand.

Teachers should also be familiar with super calculator modes of computer use as as classic application. As home computers become more common, perhaps little formal work in this area will be necessary. Clearly word processing must be covered; every teacher does so much word processing manually that none should be left ignorant of how much word processing help the computer can give.

With respect to T1.4, the long range and the immediate implications of computing as a form of artificial intelligence should be taught. The excitement of learning to think about thinking and of contemplating the powers and limits of human intelligence are so significantly linked with computing experience that this aspect must be studied--the opportunity is too great to pass up. Artificial intelligence may best convey both the power and limitation of computing in education. Acquaintance with any of several perspectives on this experience is essential and can be taught using such projects as the LOGO work [7] or the SOLO work [8]. A growing body of fiction about computing can also contribute effectively to the teacher's insight into the emerging world [9,10].

With respect to T1.5, teachers must know where to look to keep abreast in this rapidly changing field. Course work and instruction should therefore routinely call attention to and require the trainee's use of a range of sources of information about computing and education.

The ideas presented above represent a minimal set of competencies which should be obtained by every teacher. The topics presented provide a framework to achieve this minimal level of competency. In addition to these competencies every teacher should also acquire the competencies listed in either Section 2.0 or Section 3.0.

## 2.0: Competencies Needed for the Teacher of Computing

While every classroom teacher should have the general set of computin competencies suggested above, the teacher of computing needs more. Th likelihood that he or she will, in addition to teaching, be forced to functio as a general resource to faculty, administration, and students only increase the need for more extensive competency in computing.

Since much of the knowledge required for such a teacher is similar to tha required of anyone desiring to be a computer professional, many of the compute competencies defined in the recent ACM Curriculum Committee report "Curriculu '78" [3] apply to the teacher as well. This sector therefore relies extensivel upon that report.

### 2.1: Competencies

The core material recommended for teachers of computer science represen essential elementary material, as well as material especially designed f educators. Computer science teachers should:

C2.1 be able to write and document readable, well structured individual programs and linked systems of two or more programs;
C2.2 be able to determine whether they have written a reasonably efficient and well organized program;
C2.3 understand basic computer architectures;
C2.4 understand the range of computing topics that are suitable to be taught as well as the justification for teaching these topics;
C2.5 know what educational tools can be uniquely employed in computer science education.

The first three competencies are of the sort commonly needed by all computing professionals and are listed in Curriculum '78 as among those to be covered by the undergraduate computer science degree program. Competencies C2.4 and C2.5 are not commonly needed by all computing professionals. They are essential only in the preparation of computer science teachers.

For individuals who are to serve as a computer resource person for their school or school system, two additional competencies have been identified.

C2.6 develop the ability to assist in the selection, acquisition, and use of computers, interactive terminals and computer services which are suitable to the enhancement of instruction; and
C2.7 be able to assist teachers in evaluation, selection, and/or development of appropriate instructional materials which utilize computing facilities.

## 2.2: Topics of Study

These competencies should be transmitted through a series of courses and other vehicles developed through joint efforts of teacher education programs and the computer science program. We present below a list of topics that should be included in the program.

T2.1 Programming Topics: Includes advanced algorithms, programming languages, blocks and procedures, programming style, documentation debugging and verification, elementary algorithm analysis, applications.
T2.2 Software Organization: Includes computer structure and machine language, data representation, symbolic coding and assembly systems, addressing techniques, macros, program segmentation and linkage, linkers and loaders, systems and utility programs.
T2.3 Hardware Organization: Includes computer systems organization, logic design, data representation and transfer, digital arithmetic, digital storage and accessing control, I/O, reliability.
T2.4 Data Structures and File Processing: Includes data structures, sorting and searching, trees, file terminology, sequential access, random access, file I/O.
T2.5 Computers in Society: Computers and their effects on governments, careers, thought, law, personal behavior; privacy and its protection; information security and its preservation.
T2.6 Teaching Computer Science: Includes: (1) knowledge of learning theories as they apply to learning about computers, (2) knowledge of several appropriate curricular scope and sequences for a variety of program goals (e.g., literacy, careers, college preparation, personal problem solving).

Curriculum '78, along with a vast amount of research in computer education, supports the inclusion of topics T2.1 through T2.5. Knowledge of programming topics, software organization, etc., are essential for the computer professional of today.

The teaching of computing is a unique computer profession. Knowing how to program, however, does not, in itself, qualify a teacher for teaching computer science. Materials on why and how to teach computer topics included in T2.6 are invaluable to the teacher of computing and should be included within a program of study training such teachers.

Competencies C2.6 and C2.7 of the previous section are required for those individuals serving as computer resource personnel for a school system. These competencies should be transmitted through the computer science

program and the teacher preparation programs. The following topics will assist in developing the required competencies.

T2.7 Advanced Topics in Computer Science: Includes advanced topics in computer organization, operating systems, architecture; database systems; computer communications.

T2.8 Computers in Education: Includes detailed knowledge of learning/teaching research as it implies effective design of institutional computing styles and systems, administrative uses of computing in our educational setting.

Including study of Computers in Education will increase the teacher's ability to assume a role of leadership in providing direction to school systems in integrating computing into its curriculum. This additional computer background should allow the computing teacher to act as a resource person to assist in fostering development and implementation of computing throughout the school, even when the other teachers know nothing of computing.

## 3.0: Subject-specific Computing Competencies Needed by Teachers

In addition to the set of universal competencies needed by all school teachers, there are additional level- and subject-specific competencies which teachers should have. Any given teacher will require at least one of these, but no one of them will be universally appropriate for all teachers. The definitions of those competencies spring entirely from the vast and highly diverse body of experience with using computing in education over the last decade. Sources representing some of this work are listed in the bibliography. The competencies can be stated generally, irrespective of the teacher's eventual level of subject; the topics, though, will vary considerably, depending on both.

### 3.1: Competencies

In terms of these subject-specific competencies, the teacher should:

C3.1 be able to use and evaluate the general capabilities of the computer as a tool for pursuing various discipline- or level-specific educational tasks;

C3.2 be able to use and evaluate alternative hardware and software systems designed to function as tutors or teacher aids;

C3.3 be familiar with alternative hardware and software systems designed to perform school administration; and

C3.4 be familiar with information and quantitative techniques of study in the (teacher's) subject.

These competencies should be developed by the teacher preparation program, tailored to suit the trainee's intended teaching level and subject. We will not present an exhaustive list of topics corresponding to these subject-specific and level-specific competencies. Instead, we will present model topics for a few selected subjects and levels.

#### 3.1.1: Topics of Study for Teachers of Early Childhood (Primary Grades 1-4)--TEC

TEC3.1 Computerless Preparation for Computing: Experience with a wide range of computerless but computing-related activities that children can participate in to enhance their readiness to understand and work with computers.

TEC3.2 Games and Simulations: Experience with a wide range of games and simulations that stimulate children to explore and better understand fundamental concepts and strategies of basic learning.

TEC3.3 Tutorial Systems: Experience with simple and complex tutorial systems focusing upon mathematics, spelling, reading, and other elementary topics, including bilingual variations of such systems.

TEC3.4 Exploratory Programming Systems: Experience with well developed exploratory systems where child-appropriate I/O subsystems such as robots are programmatically manipulated by the child in a discovery or problem-solving approach.

Less work has taken place in the area covered by TEC3.1 than one might expect. Despite the likely widespread availability of micro-processors in the immediate future, computerless computing activities can still be very useful. By contrast with heavily machine-dependent activities, they provide a more contemplative, less involved opportunity to examine some of the fundamental ideas connected with computing. They thus allow those using them to deepen their understanding even if they have access to computers. Typical examples may be found in some of Papert's work [11] and in Taylor [12].

Vast quantities of games and simulations are available for TEC3.2, but careful choices should be made in selecting them. Many are not well written, either from a programming point of view or from a child-user point of view, and none should be selected unless it is both. Some of the best work in this area at this age level came out of the People's Computer Company, under the initial stimulus of Albrecht [13].

With respect to TEC3.3, though much has been developed, not all of it is good. The experience of the teacher should certainly include at least one good system and some discussion of what lies behind it. The work of the CCC group under Suppes is certainly a worthy example in this category [14].

Finally, new exploratory systems relevant for TEC3.4 are appearing, but the pioneering work is still for illustration. In particular, the XEROX work which produced SMALLTALK [15] and the LOGO work, particularly as Seymour Papert has advertised and sustained it [16], is outstanding.

Microprocessors can be the primary machine type used, but not to the point the trainee is left ignorant of the advantages of larger shared systems.

3.1.2: Topics of Study for Teachers of Foreign Language--TFL

TFL3.1 Games and Simulations: Experience with a wide range of games and simulations designed to provide cultural background and informal language learning, using the culture as context and the language as the medium of communication in the game or simulation.

TFL3.2 Tutorial Systems: Experience with tutorial systems designed to enhance the learning of a foreign language through a carefully arranged body of interactive experiences driven by competency-based, computer-administered testing.

TFL3.3 Foreign Language Text Editing: Experience with a powerful text editor used to create and manipulate texts in a foreign language.

Under TFL3.1, simulations based on relevant activities and situations in the language-culture can provide insight into the language difficult to obtain in other ways. These, and many popular computer games, should also be used to provide a more informal language practice for learners. This practice can take two forms: (1) translating, and (2) informally using the language. Teachers should become familiar with the practice of translating all user text of appropriate games and simulations into the target language, thus preparing to have their students do such translation. Teachers should also have wide experience with playing games whose text is entirely in the target foreign language and which expect all player responses to be rendered in that language. Such playing in a foreign language can be a valuable informal enhancement. Experience with a wide range of such games and simulations may also suggest new, more appropriate ones which the teacher can create or have others, including students, create. Some attempt to create such new material (or new variations of old material) should be part of every foreign language teacher's training. Naturally, where audio is available, it should be appropriately used.

There are many examples of language drill and practice suitable for use under TFL3.2. Work such as that done by Suppes [17] at Stanford should certainly be familiar to language teachers, though alternatives certainly exist [18]. Work in this area should rely as heavily upon audio and graphics as possible, thus cutting down on the automatic tendency to always translate from the native language and to develop competence only in reading and writing the foreign language.

TFL3.3 should ensure that teachers become comfortable with using a suitable computer text editor to manipulate text in the target foreign language. With appropriate accent mark capabilities, such editors can encourage language learners to practice much more prose writing and thus enhance their overall command of the language.

3.1.3: Topics of Study for Teachers of Physical Science--TPS

TPS3.1 Exploratory Programming Systems: Experience with well defined exploratory systems through structured, discipline-appropriate languages; systems must include graphic capabilities, systems must be programmably controllable by the student, and be oriented to discovery through problem solving activities relevant to the physical sciences.

TPS3.2 Tutorial Systems: Experience with tutorial systems designed to enhance learning of the physical sciences through a carefully arranged body of interactive experiences driven by competency-based, computer administered testing.

TPS3.3: Games and Simulations: Experience with stand-alone games and simulations designed to enhance understanding of specific physical phenomena or significant past experiments.

TPS3.4: Classroom/Laboratory Management: Experience with automated management of people learning, time and resources including automated inventorying, laboratory information/reference systems; in general, uses of the computer to provide the science teacher with more time to work with individuals.

The possibilities under all three topics for physical science teachers have been extensively explored already by Bork [19] and others [20]. Their careful work and well documented analysis should be extended and incorporated in the training of physical science teachers. Such training should include experience with relevant examples which illustrate the three topics; it should also require each trainee to construct selected, similar small modules of computer-supported instruction as a normal part of teacher training.

## Summary

This paper has addressed the computing competencies needed by the precollege teachers. These competencies are listed in three groupings. These groupings are based on the involvement of the teacher in computer-related activities. The first set of competencies represents the basic computing skills needed by all teachers. These are essential if teachers are to assist society at large to become computer literate. The second set relates to teachers who want to specialize in teaching of computing and/or the utilization of computing background. The third set provides the proper background to allow the teacher to utilize computing in presenting subject-related material. Because of the variation of subject matter, implementation examples have been given for teachers of grades 1-4 (early childhood), for teachers of foreign languages, and for teachers of physical science. These examples are not meant to be all inclusive, but to indicate the level of necessary background knowledge.

Before graduating from a teacher training program, all teachers should be required to acquire the first set of competencies and either the second or third set. This requirement will prepare each teacher for the utilization of computing in the classroom.

No attempt has been made to package the competencies into specific courses. It is felt that each environment will possibly require a different technique for the introduction of the material.

Another group of individuals that need to be considered are the current in-service teachers. The above-described competencies are as important for them as for our future teachers. In-service courses must be developed to provide the indicated background for in-service teachers.

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# REGIONAL SAMPLER:

# HOW SIX SCHOOL DISTRICTS ARE USING COMPUTERS

ARKANSAS

NORTH LITTLE ROCK PUBLIC SCHOOLS

RAYMOND SIMON

DIRECTOR, COMPUTER SERVICES

NORTH LITTLE ROCK PUBLIC SCHOOLS - COMPUTER SERVICES DEPARTMENT
ADMINISTRATION BUILDING - 2700 POPLAR STREET - PO BOX 687
NORTH LITTLE ROCK, ARKANSAS 72115

COMPUTER CONFIGURATION

IBM System 34
5340 Central Processor
128K Main Storage
63.9 Megabyte Fixed Disk
One 5256 Line Printer - 300 Lines/Minute
Sixteen 5251 Display and Work Stations
-Four On Sight
-Twelve At Remote Sites (Cafeteria Warehouse, Maintenance Warehouse, Media Center, Skills Center, Transportation Department, Central Jr. High, Ole Main Sr. High, Northeast Sr. High 5 )
One 3741 Diskette Recorder
One 2956/3 Mark Sense Reader
Software To Support The System, Including RPG II And BASIC Compilers

One Commodore Pet Computer Which Supplements Instructional Applications

COURSE OFFERINGS (All Classes Meet For A Full Period Daily)

COMPUTER SCIENCE - Students learn about the history and development of the computer and characteristics of machine language, assembler language and major high level languages. Programs are written in theoretical machine and assembler languages and BASIC and/or FORTRAN. Included in the course is an introduction to flow charting, data processing techniques and commonly used hardware. Data files, storage devices, systems development and management, social implications of computer technology, the future of data processing and career opportunities in the computer field are studied. The newer developments such as teleprocessing, multiprocessing, multiprogramming and time sharing are discussed.

Students collect cartoons and give oral and written presentations on newspaper and magazine articles. Data Processing personnel from local businesses speak to the class concerning careers in the computer field and advise them about qualifications and preparation for jobs. Students make several visits to the school district's computer center. They learn how to operate data entry equipment and use the System 34 to execute teacher programmed projects.

Text Used - Introduction to Computers and Data Processing, Shelly and Cashman, Anaheim Publishing Co., (1980)

COMPUTER PROGRAMMING - RPG II techniques studied are: 1) input/output processing; 2) arithmetic operations and edit codes; 3) comparing and control breaks; 4) multiple control breaks; 5) fetch overflow; 6) exception output; 7) array processing; 8) table look-up; 9) array look-up; 10) creating sequential files on tape and disk; 11) file update and maintenance; and 12) other RPG statements.

Students execute their programs, performing all necessary data entry and machine operation procedures. Each student spends an average of one hour per week at the computer center, with additional time at the terminal located at his or her high school. Students design and execute all phases of a payroll program and an installment payments program, including input/output formating. The final project of the year was the creation of a file consisting of pertinent data about the members of the class. Each student runs a listing of this file which he is allowed to keep as a souvenir.

Text Used - RPG II, Shelly and Cashman, Anaheim Publishing Co., (1976)

North Little Rock Public Schools

Department of Computer Services

1980-81 Applications

I. Administrative

A. Payroll
- Current, quarter-to-date, calendar year-to-date and fiscal year-to-date summaries on employee wages, fringe benefits, deductions and absences.
- Monthly and bi-weekly payroll checks.
- Quarterly and annual reports to educational, governmental and fringe benefit agencies.

B. Personnel
- Complete employment-related statistics on each employee, including education, work experience, certification information, job classification, absence statistics and salary information.
- Employee contracts.
- Employee directory.
- Annual statistical reports and surveys to educational and governmental agencies.
- Statistical reports for local administrative purposes.
- Salary schedule simulation.
- Salary budget projections.
- Preparation and analysis of annual personnel needs assessment by teacher and building.
- Address labels for mailings.

C. Accounts Payable/Budgeting
- Bill listings and expenditure summaries.
- Encumberance and expenditure analysis by budget categories.
- Vendor checks and vouchers.
- Budget reports by school and administrative areas.
- Budget projections and comparisons.
- Graphic analysis of expenditures.
- Graphic analysis of budgets.
- Detailed and summary reports for annual audit.

D. Fixed Assets
- Real estate values and descriptive data by site.
- Detailed listing and valuation of major equipment by building.
- Valuation of fixed assets for insurance purposes.

E. Food Services
- Detailed listing and valuation of warehouse food and supply items.
- Detailed listing and valuation of kitchen food and supply items.
- Daily transactions analysis of food and supply items shipped into and out of warehouse.
- Food cost and usage analysis by kitchen.
- Out of stock and stock re-order reports.

F. Custodial/Maintenance
- Detailed listing and valuation of warehouse supply items.
- Detailed listing and valuation of supplies at each building.
- Daily transactions analysis of supply items shipped into and out of warehouse.
- Supply usage analysis by building.
- Out of stock and stock re-order reports.
- Review of maintenance activities and related costs by date, location and type of service.

G. Purchasing
- Vendor identification by bid interests.
- Preparation of custodial supply bid for distribution to vendors.
- Preparation of instructional supply bid for distribution to vendors.
- Address labels for bid mailings.

H. Media Center
- Detailed information on each film and filmstrip available for distribution to schools.
- Daily transactions analysis of film and filmstrip bookings to schools.
- Preparation of card catalogues and film listings for distribution to schools.
- Monthly and yearly reports of film usage.

I. Utilities
- Consumption statistics of electricity and gas by building and by month.
- Graphic analysis of electricity and gas consumption.

J. Student
- Accumulation of extensive data base on all students attending North Little Rock Public Schools.
- Student population analysis by geographic zone.
- Student listings by building and homeroom teacher.
- Preparation of busing letters.
- Daily attendance summaries and reports.
- Nine weeks attendance summaries and reports.
- Yearly attendance summaries and reports.
- Various listings of student data for use by principals, counselors, and support staff.
- Address labels for family mailings, including district newsletter.

II. Computer Managed Instruction (Secondary Schools)

A. Scheduling
- Complete scheduling program including homeroom lists, class rosters, schedule cards, master schedule listings and class load by teacher and subject.

B. Grade Reporting
- Complete grade reporting program including grade sheets, report cards, teacher verification lists, grade distribution by teacher and subject, class rankings, failure lists, honor roll lists, permanent record labels and other information for use in scheduling and counseling.

III. Computer Assisted Instruction

A. Tutorial
- Modular units on computer concepts and operational terminology, used by both students and staff.

B. Drill and Practice
- Modular units emphasizing basic mathematics skills.

C. Games
- Motivational activities in logical thinking.

IV. Curriculum

A. Computer Science/Programming
- Courses in computer science and programming at Ole Main and Northeast, with hands-on activity at host computer and remote terminals.

B. Gifted Program
- Individual and small group instruction for elementary and secondary gifted students, with hands-on activity at host computer and remote terminals.

C. Field Trips
- Visits to classes and clubs by personnel in Computer Services.
- Field trips by classes and clubs to host computer site.

D. Business/Office Occupations
-Unit on Data Processing at Ole Main featuring hands-on activity with remote terminal.

E. Career Orientation
- One day instruction by Computer Services at Central Jr. High followed by classroom teacher discussion of textbook unit on careers in Data Processing.

North Little Rock Public Schools

Department of Computer Services

1981-82 Proposed Applications

All 1980-81 Applications Retained

I. Administrative
-Energy Conservation Incentive Program
-Vehicle Maintenance and Cost Analysis
-Vehicle Parts Inventory
-Applicant Information System

II. Computer Managed Instruction
-Test Scoring and Analysis (Standardized and Teacher-Made)

III. Curriculum
-Second year programming students - expanded application programming
-Gifted students - expanded application programming
-Business/Office Education students - expanded unit on Data Processing
-Regular classroom K-12 - more frequent one/two day instruction sessions in computer literacy
-Computer art in Junior Highs
-Graduate level course in computer literacy/educational applications for certified staff

MISSISSIPPI

HUMPHREYS COUNTY SCHOOL SYSTEM

BETTY WHITE

COMPUTER PROCTOR

REMEDIAL MATHEMATICS TEACHER

## BASIC SENTENCES

Basic Sentences covers levels 2.5 through 3.5. It is not designed for non-readers. It is useful for beginning readers or very low level readers, but students must (1) be able to recognize the letters of the alphabet and (2) have a basic sight recognition vocabulary (such as the Dolch List). It is being used to develop reading skills with a core of common words before they are ready for Reading for Comprehension.

Example:

_____ ran.
He Run Is

The dog is _____.
big a the

She is _____ sister.
be my to

Alice _____ happy.
book was school

## READING FOR COMPREHENSION

Reading for Comprehension is a drill-and-practice reading curriculum for grades three through six. The curriculum provides students with exercises in five specific areas: Word Attack, Vocabulary, Literal Comprehension, and Work-Study Skills. In addition, it offers a sixth strand, called Paragraphs, in which students can integrate some of the specific skills they have practiced in the other strands as they read an entire paragraph and answer the associated questions. Because the program keeps track of each student's progress in each strand, it can tailor exercises to the needs of the individual student.

## CRITICAL READING SKILLS

Critical Reading Skills is designed to fill the void in reading instruction that frequently occurs in the years following the concerted efforts to teach reading at the elementary level. It contains 150 reading passages drawn from books of science, literature, history, etc. After students have read a passage they answer a series of questions designed to examine their comprehension of the material they've read. The second part of the CRS curriculum is a vocabulary section, which contains 760 target words for students to learn. A reading lesson may be up to 20 minutes long. Students may work only on vocabulary or reading comprehension or on a mixed lesson with questions from both sections.

## PROBLEM SOLVING

Problem Solving, Grades 3-6 is designed to give elementary school students practice in solving story problems. The curriculum provides an opportunity for students to apply their computational skills to everyday situations. Since problem solving skill are sometimes a stumbling block for students, the curriculum tailors lessons to each student's ability level.

It emphasizes problem-solving skills, not computation. Although students are require to do all of the computations at the third and fourth grade levels, grades five and six provide the use of a "calculator" on many of the exercises. These exercises focu on the strategy of solving the problem rather than on computing the right answer.

It is divided into 7 Topics:

1. How Many
2. Money
3. Mystery Numbers and Age Problems
4. Measure
5. Number Systems
6. Time, Rate and Distance
7. Geometry

## MATH 1-6

The math program is one of the most highly individualized CAI (computer assisted instruction) programs ever developed. It tailors lessons to each student's level, guarantees a successful experience, and increases student motivation to do well in mathematics. In addition, it provides the teacher with an effective means of diagnosing class and individual weaknesses. Lessons are not stored in the computer's memory but are generated by the computer as the student works at a terminal. Because the computer immediately checks the student's response to each item, it can adjust the lessons' difficulty level while the lesson is in progress. Futhermore, it can make this adjustment in each concept area on which the student is working.

The concept areas covered in Math 1-6 are as follows:

Number Concepts
Horizontal Addition
Horizontal Subtraction
Vertical Addition
Vertical Subtraction
Equations
Decimals
Measurement
Horizontal Multiplication
Laws of Arithmetic
Vertical Multiplication
Division
Fractions
Negative Numbers

## MATH STRANDS 7-8

Math Strands, Grades 7 and 8 is much like Math 1-6 in that it is highly individualiz It uses a strand structure to provide practice in material covered in conventional 7 and 8th grade math courses. The exercises in each strand are arranged in an ascendi order of difficulty. The grade level span in the MM program ranges from 7.00-8.95. The concepts covered in MM are as follows:

Positive Integers
Fractions
Decimals
Percent
Negative Numbers
Equations
Inequalities
Measurement
Number Theory

## LANGUAGE ARTS STRANDS

This is a highly individualized program consisting of eight strands (or subject areas) ascending in order of difficulty. The subject areas included are:

Strand A Principal Parts of Verbs

Strand B Verb Usage

Strand C Subject Verb Agreement

Strand D Pronoun Usage

Strand E Contractions, Possessives, and Negatives

Strand F Modifiers

Strand G Sentence Structure

Strand H Mechanics

## LANGUAGE ARTS TOPICS

Language Arts Topics - contains ninety topics. A topic is a group of lessons on a single subject. There are twenty topics for each grade (3-6) and ten supplementary topics for students with special language problems. Teachers can select topics from any grade for their students. The topics cover the following subjects:

Principal parts of verbs
Verb usage
Modifiers
Pronoun usage
Contractions
Possessive
Negatives
Subject-verb agreement
Sentence structure
Captalization
Punctuation
Plurals
Letter writing

The supplementary topics for special language problems give practice in use of directional words, pronouns, prepositions, and determiners.

A topic consists of about 8 lessons on one subject. Each lesson has 2 parts: (1) an explanatory lesson with examples, and (2) items that give practice in the concept that has been introduced.

Language Arts Topics is much like Language Arts Strands, each containing the same subject matter. The difference is in their structure. LS uses strands to provide individualized mixed drills. In LT, the entire class receives lessons on a topic assigned to them by the teacher or proctor.

## FUN

Fundamentals of English - Designed to give practice in the language skills to junior and high school level students. It deals with the common problems in written standard English. A chapter test follows each set of lessons.

Fun is divided into six areas. They are as follows:

Parts of sentences
Sentence fragments
Run-on sentences
Principal parts of verbs
Double negatives
Subject-verb agreement

## ADULT SKILLS COURSES

| | |
|---|---|
| Adult Reading Skills | (ARS) |
| Adult Language Skills I | (ALS I) |
| Adult Language Skills II | (ALS II) |
| Adult Arithmetic Skills | (AAS) |

These courses were developed to meet the educational needs of high school students or adults who lack basic reading, language, and arithmetic skills. Each is a separate course which allows the student to work at an individualized pace. Also, each course contains a diagnostic procedure that allows students to skip through concepts they already know. The adult skills courses can be used alone or as preparatory courses for the GED curriculum.

ARS - Teaches reading skills equivalent to those expected of students who have successfully completed elementary school. The material includes:

- Word attack
- Vocabulary
- Literal comprehension
- Interpretive comprehension
- Work study skills

ALS I - Covers language skills like those taught in the elementary grades.

ALS II - Builds on the base provided by ALS I to proceed to more complex material.

The content of both courses is oriented towards topics of interest to adults. The nine areas covered in both courses have different levels of difficulty for each course. The areas covered are as follows:

- Principal parts of verbs
- Verb usage
- Subject-verb agreement
- Pronoun usage
- Contractions, possessives, negatives
- Modifiers
- Sentence Structure
- Mechanics
- Topics (special strand that contain short lessons on topic covered in other strands)

AAS - Is more limited in scope than the elementary curriculum. It has fewer exercise types and provides more systematic practice in skill development. A self-contained diagnostic test determines the students placement in each strand. Movement through a single strand is independent of all other strands. The 8 topics covered in AAS are as follows:

- Addition
- Subtraction
- Multiplication
- Division
- Equations
- Fractions
- Measurement
- Decimals

## GENERAL EDUCATION DEVELOPMENT

GED - Designed to prepare students for all parts of the GED Examination. The program contains five courses, one for each test on the GED exam.

- GED English
- GED Literature
- GED Social Science
- GED Mathematics
- GED Natural Science



all five courses are completed, the student should be ready to take the GED exam. of the questions are fill in the blank, but most are multiple choice, like the

## ALGEBRA

Algebra - Teaches basic algebraic concepts. Accompanying the course is a textbook which explains and shows examples for each lesson. Students work at their own rate of speed and receive extra work in difficult areas. The topics covered are:

Real number system and its basic properties
Solution of equations
Graphing
Solutions of systems of linear equations and inequalities
Polynomials
Rational expressions
Exponents
Solution of quadratic equations

## ENRICHMENT MODULES

Enrichment Modules - A high school level course dealing with geometry, statistics, functions, and graphing. The lesson at the terminal will tell the students when they need to refer to the figures in the text that accompanies the course.

MISSISSIPPI

JACKSON PUBLIC SCHOOLS

SUSAN PURCER

SECONDARY CURRICULUM COORDINATOR

Computer Usage in Jackson, Mississippi

Public Schools

Background Information

The Jackson Municipal Separate School District serves approximately 30,000 students in 54 schools: 37 elementary, 10 junior high, and seven senior high. In addition to these traditional schools the district has two special centers: Career Development Center and Academic and Performing Arts Complex. The teaching staff includes about 1700 certified employees. Standard administrative tasks are carried out with the use of a Honeywell mainframe that is to be replaced by an IBM model in July 1982.

The computer is also being used as a management source for a program known as Tracer. This program evaluates student work by indicating pass or fail for each objective that was tested. The teacher then receives a print out which includes a profile of the class and for the individual. Approximately half of the elementary schools are taking advantage of this service.

Two elementary schools have a mini-computer configuration from the Computer Curriculum Corporation. This program centers on reading and math skills and has contributed to significant improvement in student achievement during the first year of operation.

Until this school year, each high school had a terminal which was located in a math/science classroom and tied in with the mainframe. This set up was not satisfactory for instructional purposes because administrative functions always took priority. This year each terminal

was replaced by an Apple microcomputer with one disk drive and a printer. Each school needs more equipment and the program needs to be extended to the junior high schools. However, the involvement of the microcomputer as an instructional tool during this year has been provided a tremendous beginning for the Jackson Public Schools.

Plans for the Future

The challenge of educational institutions is to prepare young people to live in their future. In this day, the schools must involve the use of computer technology to deal with this responsibility. Computers are awesome creatures which warrant very careful study before they are properly introduced into the curriculum. In Jackson, we have accepted the premise that educators alone cannot adequately define the instructional program which involves the computer in such a way that the students will be able to function properly in the world of tomorrow.

We are forming a partnership with the business/industry community as we establish a Planning Team of internal and external personnel. The committee is composed of teachers, administrators, media specialists and data processing specialists from within the district. These people are joined by representatives from the various businesses/industries in the Jackson area. Most of these companies have been involved with the Adopt-A-School Program.

The task of the Planning Team is outlined as follows:

1. Examine the curriculum (subject, grade by grade)
2. Identify areas where the computer could strengthen the instructional program

3. Identify areas where the computer activities should be developed

4. Review and evaluate available software

5. Determine in which areas courseware needs to be developed for JPS

6. Determine what hardware is necessary to carry out the proposed program

7. Examine funding possibilities

8. Design a plan to phase-in the implementation of computer usuage.

The Planning Team will submit recommendations based on the task outlined above. This group will also be charged with the responsibility of designing a staff development program that will include:

1. Activities such that all educators in the district will be computer literate

2. Training for personnel before any proposed program is implemented

Much of the success of the model is contingent on these latter areas of responsibility.

Each group respresented has a different perspective and insight into each area mentioned previously. Educators can translate into the curriculum what the business/industry people identify as necessary skills for the working world. Basically they will develop a program based on when, where and how the computer can enhance learning. This group must be mindful, however, that the computer is not always the best source for activities.

The model that this committee designs should meet the needs of students at the following three levels.

1. Expose children to the technology so as to prepare them to function in a computer oriented society. Students may not have any interest in pursuing computer activities but can appreciate the usefulness of the technology.

2. Identify the potential of some interested students so that they could enter training programs after graduating from high school.

3. Provide necessary training for students who will continue their formal education in a field related to computers or which utlizes the technology.

Therefore, the program will follow Dr. Robert Taylor's approach of using the computer as a tutor, a tool, and a tutee.

NEW MEXICO

BLOOMFIELD MUNCIPAL SCHOOLS

JAMES DAY

DIRECTOR OF COMPUTER ACTIVITIES

AND MATHEMATICS CURRICULUM

## INTRODUCTION

Everything that the Bloomfield School System is presently doing with microcomputers is closely tied to curriculum development. The plan that we started with three years ago was aimed at developing an accountable system. At this time we began to develop a curriculum based upon the skills management idea.

With the help of Title IV-C funding, we purchased and implemented a mathematics management system developed in Jefferson County Colorado. For this reason the curriculum developed more rapidly in mathematics than in the other areas.

As the other curricular areas were completing work on their management plans, we introduced computers into our mathematics system. This expansion of the project was again helped along by Title IV-C funding.

We are now using our mathematics project as a pilot for our system, as we begin to use microcomputers in recordkeeping, with the management system, and as an aid with instruction.

### Stage I

### Program Assessment
### Why we chose to develop our own system

I. Computers would be of great value in the keeping of records and would provide the teachers with easy access to these records.

II. Microcomputers would be readily accessible to the students for instructional purposes.

III. The teachers wanted a system with the flexibility to

- change as our curriculum changed;
- provide them with the options they wanted;
- provide new services as they became more aware of the capabilities and potential of computers.

## Stage II

### Recordkeeping and Test Production

I. Each teacher is provided with a diskette containing programs and files that provide the following information and services:

- past teachers
- C.T.B.S. information
- dates of attendance
- past objectives taught, tested, and mastered
- present objectives taught, tested, and mastered
- groupings of students who have failed to master any given objective
- updating of present objectives as they as mastered.

II. Each grade level is provided with diskettes that will produce tests over any objective(s) that the teacher may choose.

III. A service that is also provided is the rapid addition to the test file of any test items the teachers would like to see included.

## Stage III

### Teacher and Community Education

I. Inservice workshops to familiarize the staff with the machines and the present system.

II. Graduate Extension classes offered through the local community college to further educate the staff as to the instructional uses.

III. Community service classes to help promote computer literacy within the community.

## Stage IV

### Introduction of Computer Assisted Instruction Materials

I. Commercial software is used when requested by the staff.

II. Development of a program to use high school students to write programs to fit the special needs of teachers.

III. Development of a program using high school students to train lower level students to use a computer, and to work as tutors to complement the computer assisted instruction programs.

## Stage V

### Evaluation and Updating of the Present Program

I. Through the year information meetings are held to give the staff an opportunity to provide input into the prog ım.

II. Periodically throughout the year student gains on objectives are mapped.

III. At the end of the year student gains on the C.T.B.S. test are measured.

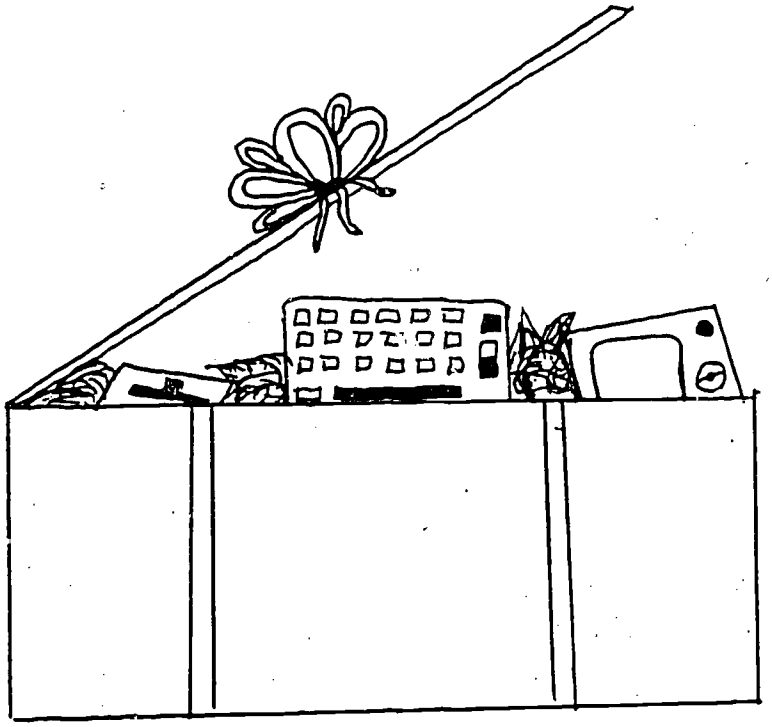
IV. The criterion tests are then correlated with the norm referenced tests so that any needed updating may be done.

## CONCLUSIONS

On the basis of the feedback we have gotten already, the Bloomfield Schools are planning on adding more computers next year. The reason for the addition of machines is to decrease the student computer ratio. This decreased ratio will enable us to proceed with our plans for the immediate future. These include:

- increased use of computer assisted instruction;
- a plan for computer based testing;
- the extension of the program into other curricular areas;
- expansion of the program to include the high school.

# CONGRATULATIONS

IT'S  A

# COMPUTER

THE MICROCOMPUTER IN THE MEDIA CENTER

Sybil Dee Connolly
Media Center Director
Windsor Hills Elementary School
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(405) 942-8673

# THE MICROCOMPUTER IN THE MEDIA CENTER

Maybe you fought for this purchase, accepted it's presence gracefully or had it forced upon you. But no matter how it was acquired, locating a microcomputer in the media center can be the best thing that ever happened to the center or your school.

If you are fortunate enough to have a microcomputer for the exclusive use of the media center, there are several directions you can go. Record keeping is a natural, and may be as simple as film scheduling or as complex as a complete circulation system. With a printer, card sets can be made, or the microcomputer can be the card catalog. Pre-packaged programing is becoming more available in these areas. Don't overlook a valuable source--parents. Put out an SOS and you might discover some that work with computers for a living or as a hobby. This is one method of acquiring programs custom made to your media center's needs.

If a Microcomputer is to be considered a part of the professional materials area, teacher usage may be varied. Some may use the machine as a "grade book" to store grades, compute averages, etc. It really doesn't take long to enter the information if it is not allowed to stack-up. Good times for computer use are before or after school and during planning periods. Often word find or crossword puzzles created with a computer and printed out can be trimed and used to make thermo-fax ditto masters. The added feature of word processing can be a welcome addition for the teacher who has to send out parential letters, make-up tests, write out assignments, etc.

If your school (like mine) has but one microcomputer for all to share then student usage may take top priority. Some students may be able to create their own programs; but for many this may be another way of doing drill and practice. Our school decided to utilize the microcomputer primarily for CAI-computer assisted instruction. (see attachment ) Because ours is a K-6 school, we have tried not to focus on one area, but offer a variety of programs on many subjects.

Naturally, access to the programs is dependent to a large extent on being aware of their existence. Having a disk system for program storage is wonderful and highly recommended, but it's also easy to "lose" track of a program. Through trial and error, we devised a method of labeling each disk and then filling out a simple index card for each program. (see attachment) A file box is used to divide the programs as to subjects for easy reference. Color clips are attached to the cards of programs acquired between catalog supplements.

The catalog of microcomputer programs was distributed to each teacher in our building as an awareness project. All programs are grouped by subject and entries follow the index card format. Teachers are encouraged to refer to this catalog when planning an unit of study, and when possible, to preview the programs for suitability. We all know how perfect some materials can sound only to find that they really don't meet the needs requirement of the class.

Creating a workable schedule can be tricky. The less complicated the better. We use the same system for the microcomputer as we do for the 16mm projector, TV, etc. (see attachment) Your school must decide if scheduling is to be done by students and/or teachers. If you opt for teacher scheduling, I offer a few hints:

1. Make the teachers as responsible as possible. You usually haven't the time to go remind them it's their scheduled time. In order to encourage their use of the microcomputer, you may need to give a lot of TLC at first.

2. If students arrive not knowing what program they are to run, send them back to find out. Providing special computer passes with room for this information will help handle this problem.

3. Schedule inservice for teachers and students on how to select, load, and run a program. This may save you time later on, but be prepared for individualized help too.

4. If possible, take some training in microcomputers either at a local college for credit, as a non-credit community education class, or at the sore where the microcomputer was purchased. Not only will you feel more confident, but you may convince others to enroll.

The range of uses for a microcomputer in your school are as restricted as the mind and imagination of the user. The media center has long been recognized as a location for information retrieval and production. What better location then for such mind expanding technology.

ATTACHMENT

C A I----------

'COMPUTER ASSISTED INSTR'CTION----------

Computer assisted instruction simply means those educational programs which your school has purchased, borrowed or written for use on the microcomputer. These programs serve much the same purpose as a filmstrip, cassette, study print, etc. They are all teaching aids which help to enhance a lesson. They may also be viewed as a reviewing or teaching tool that the teacher and/or media staff chooses to utilize.

CAI can be as successfully used by the academically gifted student as by the student having learning problems. Not every program can be used by every student, but this is true of any learning aid. Just as you use many different teaching styles in presenting a concept, you will find different microcomputer programs centering around the same topic. Previewing a program to determine it's suitability really is the best course. You are the best judge of what your students can manage.

Methods of acquiring CAI programs are almost as varied as the types of microcomputers on the market. If your community has a "users group" for your school's brand of computer, then join it. The exchange of programs will increase your holdings and is worth the registration fee. More and more audio-visual companies are adding computer programs to their catalogs, but they will not allow the programs out for "preview". If there is a local representative, he or she will come to your school and demonstrate them. It's important to see these programs before purchasing them, as they are not returnable. A third method of acquiring programs is to type them into the computer yourself. Educational magazines are beginning to publish programs that other teachers have written. Of course writing a program yourself will guaranty it's meeting your needs.

SAMPLE FORMS

COMPUTER SCHEDULE:

| TIME | MON. | TUES. | WED. | THUR. | FRI. |
|---|---|---|---|---|---|
| 8-8:30 | | | | | |
| 8:30-9 | | | | | |
| 9-9:30 | | | | | |
| 9:30-10 | | | | | |
| | | | | | |

PROGRAM RECORDS:

PROGRAM TITLE

DISK LOCATION RECOMMENDED GRADE LEVEL

BRIEF DESCRIPTION OF PROGRAM

* SPECIAL NOTES (i.e. needs printer, integer program, teacher input required, etc.)

TEXAS

DALLAS INDEPENDENT SCHOOL DISTRICT

BEATRIZ BELTAN

COORDINATOR

COMPUTER ASSISTED SPANISH ENGLISH TRANSITION SEQUENCE

# COMPUTER ASSISTED SPANISH ENGLISH TRANSITION SEQUENCE (C.A.S.E.T.S.)

## OVERVIEW OF PROJECT

Description: The goal of the Computer Assisted Spanish-English Transition Sequence (C.A.S.E.T.S.) project is to develop and improve the English language skills of seventh and eigth grade limted English proficiency (LEP) students. The instructional model consists of

1. Placing a learning Center with one micro-computer in the Social Studies classroom where LEP students receive regular instruction in English.

2. Placing another micro-computer in the English as a Second language classroom attended by Level 1, 2 and 3 LEP students.

Social Studies materials (based on DISD Baseline) in Spanish and English (Bilingual) are presented to the students through the micro-computer in the Social Studies classroom Learning Center, in order to reinforce the teacher instruction, which is in English only. The Social Studies scope is expanded at the Learning Center through the Life Skills, a group oriented Computer Assisted Instruction with accompanying activity cards in English which instructs the students on basic functional day-to-day knowledge.

In the English as a Second language classroom the students are instructed through CAI, in reading and writing skills, which are based on TABS, ITBS, and BOAT test objectives. The vocabulary employed in these English materials is the American History and Texas History vocabulary that the students are using in the Social Studies classroom. English Language Development (ELD) is divided into two levels (one and two) which correspond to levels 1 and 2 and 3 and 4 according to the Language Assessment Scale II criteria.

Second Year Scope of Work
1981-1982

OBJECTIVE (a) COMPONENT: Basic Instruction

1.0 By the conclusion of the 1981-82 school year student achievement will increase as follows:

a. 70 % of the participating seventh grade students will increase their proficiency on the selected language proficiency instruments by a raw score of 8 for students in Level One, a raw score of 6 for students in Level Two, a raw score of 4 for students in Level Three, and 30% of the students will increase their proficiency by a raw score of 2.
b. 70% of the participating seventh grade students will master at least 70% of the concepts tested and 30% of the students will master 50% of the concepts tested on a criterion referenced test (English and Spanish) in social studies.
c. 80% of the participating eighth grade students will increase their proficiency on the selected language proficiency instrument by a raw score of 8 for students in Level One, a raw score of 6 for students in Level Two and a raw score of 4 for students in Level Three, and 20% of the students will increase their proficiency by a raw score of 2.
d. 80% of the participating eighth grade students will master at least 80% of the concepts tested and 20% of the students will master 60% of the concepts tested on a criterion referenced test (English and Spanish) in social studies.
e. Participating students will show significantly higher gains on the norm referenced test in social studies than a control group of students.

2.0 By the conclusion of the 1981-82 school year:

a. The participating seventh grade teachers and CASETS staff will compile a log showing how the classroom instruction of ELD and native language support materials for seventh grade are coordinated to DISD Baseline and CAI.
b. Teachers will conduct at least two parent conferences.
c. Teachers and CASETS staff will develop a program presentation for different audiences.
d. The Staff will organize and facilitate the participation of parents and students in the Advisory Council.

3.0 By the conclusion of the 1981-82 school year:

a. The Project Evaluator will provide three evaluation reports: a start up report, an interim report, and a final evaluation abstract.

4.0 By the conclusion of the 1981-82 school year the Title VII CASETS staff will:

a. Adapt for CAI and design test native language support materials and ELD materials for seventh grade social studies (Texas History) as evidenced by 5 units of audio native language support lessons and 5 units of ELD materials.
b. Develop a management system for use with CAI social studies materials and CAI ELD materials for seventh grade.
c. Write a teacher's manual for the seventh grade ELD and social studies materials.
d. Develop criterion referenced tests based on the ELD and social studies materials for seventh grade.
e. Pilot test the CAI ELD materials and native language support materials for eighth grade.
f. Begin to revise ELD materials and CAI native language support materials.
g. Provide three evaluation reports.

OBJECTIVE (a) COMPONENT: Training

1.0 By the conclusion of the 1981-82 project year CASETS staff, administrators, teachers and parents will have had an opportunity to participate in appropriate ongoing staff development activities. Teachers will achieve 80% of the competencies listed on a teacher's observation checklist after receiving training in specific methods and techniques.

2.0 By the conclusion of the 1981-82 school year the Teacher/Parent Specialist will:

a. Compile information for the development of a Teacher Training Model for secondary

b. [illegible] for a Parent Training and Involvement Model for parents of [illegible] students.

TEXAS

DALLAS INDEPENDENT SCHOOL DISTRICT

VICKI SMITH

CURRICULUM WRITER

INSTRUCTIONAL TECHNOLOGY

DALLAS INDEPENDENT SCHOOL DISTRICT
DEPARTMENT OF CURRICULUM DEVELOPMENT
INSTRUCTIONAL TECHNOLOGY BRANCH
214/361-9472

# PROJECTS

## MCMP (MICROCOMPUTER MATHEMATICS PROGRAM)

*This is the District's CAI basic skills instruction and drill package in Mathematics. It consists of strands in Addition, Subtraction, Multiplication, Division, Numeration, Fractions, and Decimals. Currently being developed is a strand in Ratio, Proportion, and Percent.*

## MCRP (MICROCOMPUTER READING PROGRAM)

*This is the District's CAI basic skills instruction and drill project in Reading. It consists of strands in Phonics, Structural Analysis, Vocabulary, and Comprehension.*

## CARS (COMPUTER-ASSISTED READING SKILLS)

*This is the Title IV-C CAI project in higher order reading skills. It consists of lessons in Distinguishing Fact From Opinion, Drawing Conclusions, and Forming Generalizations.*

## CAMS (COMPUTER-ASSISTED MATHEMATICS SKILLS)

*This is a Title IV-C CAI project in higher order mathematics skills. It consists of lessons in Word Problems, Patterns; and Series and Sequences.*

# Dallas ISD MICROCOMPUTER MATHEMATICS PROGRAM

## OVERVIEW

The Microcomputer Mathematics K-8 Program (MCMP) is a guided drill and practic program designed to meet the needs of the individual student by reinforcing and extending concepts presented by the teacher. MCMP contains lessons for every student from the reluctant learner to the gifted. Lessons are embellish with visual displays that are pertinent to the developmental process of a concept, thus lending support to the instruction provided by the teacher. Computational skills are presented with a steady increase in difficulty to kee a student challenged yet working at his own pace. A student receives immediat private correction, assistance and review as needed and positive reinforcement MCMP contains mathematical concepts from a K-8 curriculum. It was designed to be used for all K-8 students and for remediation at the high school level.

## LESSONS

Each strand has lessons grouped by skill level into sections. Each section includes several lessons and each lesson includes several drill and practice sessions. Lessons within each section range from developmental to more practi oriented with each lesson containing guided instruction, positive reinforcemer and immediate assistance based on the learner's needs. Different problem sets are generated each time a lesson is attempted.

## STUDENT RECORDS

The student record form provides an overview of performance on completed lesso and is updated after each student session on the terminal. This form streamlines overall program management and facilitates the assignment of lessons, a correlates closely with the teacher's regular record keeping procedures.

## PLACEMENT

Appropriate skill level placement is based upon individual student performanc The flexibility of MCMP also provides for teacher-prescribed placement of students within a specific skill area.

## ADVANCEMENT

After successful completion of a lesson the teacher can quickly move the student ahead to more challenging lessons or provide more intensive practice for reinforcement. Remedial lessons are provided for deficient skill areas.

## MANAGEMENT

Microcomputer capabilities streamline the management aspect of this individua program.

One tape or strand loaded into the microcomputer provides a range of skill levels to suit individual student needs. MCMP includes a suggested progression of sections among the strands which not only provides variety for the student, but also insures broader concept and skill development.

## STRANDS IN THE DALLAS MICROCOMPUTER MATHEMATICS PROGRAM

### ADDITION

Lessons in the addition strand incorporate both horizontal and vertical formats.

Graphic displays are used to introduce the student to the concept of joining two sets.

Gradual development of skills in each area: basic facts, adding with or without carrying, multi-addend and multi-digit problems, horizontal to vertical rewrite.

To focus on addition and regrouping skills the cursor (video display designating where the next entry is placed) leads the student to place digits in the sum and to record "carries". This special feature allows the student to work problems as though using pencil and paper.

### SUBTRACTION

Lessons in the subtraction strand incorporate both horizontal and vertical formats.

Graphic displays are used to show separation of sets and to provide a visual for which the student writes a subtraction equation.

A gradual development of and practice with basic facts and problems with and without borrowing systematically teaches subtraction skills with up to five digits.

Special lessons specifically address problems involving borrowing across zeros.

To focus on subtraction and regrouping skills the cursor leads the student to place digits in the difference and to record "borrows". This special feature allows the student to work problems as though using pencil and paper.

### MULTIPLICATION

Repeated addition serves as the vehicle for introduction of the basic multiplication facts. Graphic displays, rectangular arrays and simple word names involve the student throughout these developmental lessons. The commutative property underlies a series of lessons to show correlation between multiplication

facts. Speed as well as accuracy is encouraged in timed response lessons.

There is gradual development from 1-digit to multi-digit multiplication involving no carrying and carrying.

Multiplication by multiples of 10 and 100 is employed in the initial development of 2- and 3-digit multiplication.

A special feature provides assistance for development of the multiplication algorithm. Flashing digits and leading cursor clue students to the next step.

The skill is extended through multiplication of 3-digit numerals.

Special lessons address problems containing zero in the multiplier or multiplicand.

## DIVISION

Multiplication facts are a basis for completing corresponding division facts.

Fraction bar format and standard division format provide variety and link fractions concepts to whole number division.

Instruction in the division algorithm includes computer assistance regarding entries in the various steps. Structured and incremented lessons require the student to progress from making one entry to making multiple entries in the division process. Flashing digits and leading cursor clue students to the next step.

Scratch pad features assist students in gaining estimation skills.

Various configurations of problems progress from a 1-digit divided by a 1-digit through a 6-digit divided by a 3-digit. Quotients with zero and non-remainders are introduced separately.

Special lessons focus on quotients containing the digit zero.

## DECIMALS

Relationships between the fractional, word, and decimal names of a number are developed through graphic displays of partitioned sets as well as place value charts. Place value concepts progress from tenths through hundred-thousandths.

Addition and subtraction skills are gradually developed. Horizontal format and vertical format problems provide practice in place value alignment.

Graduated multiplication lessons initially focus on counting the decimal places in the factors and decimal point placement in the product. Special lessons address multiplication of a decimal by powers of ten and related number patterns.

Related fractions concepts and graphics (moving arrows) improve student understanding of decimal point placement in the quotient. Specific lessons address whole number divisors, 1-digit through 3-digit decimal divisors, zeros in the dividend.

To focus on steps in the multiplication and division algorithms, flashing digits, leading cursor and scratch pad features assist the student.

Lessons requiring the student to convert fractions to decimals give additional practice in division and further establish the relationship between fractions and decimals. Terminating and repeating quotients are addressed separately.

## FRACTIONS

naded regions and partitioned sets introduce concepts and skills in identifying, writing and multiplying fractions.

Developmental lessons on equivalent fractions, comparison of fractions, addition and subtraction involve shaded regions.

Special attention is given to a gradual development of all operations with fractions and mixed numbers. Instructional messages, guiding questions and special hints maintain student involvement and lead the student past common pitfalls.

Addition and subtraction presented in horizontal and vertical formats address like and unlike denominators. Individual lessons address reducing, carrying and borrowing for both simple and mixed fractions.

Guided, developmental lessons are included for multiplication and division of simple fractions and mixed numbers. Shortcuts are included.

## NUMERATION

The concepts and skills developed in this strand strengthen the mathematical understandings of the concepts and skills addressed in each of the other strands. Many lessons reinforce those skills, others extend them. Pre-algebra lessons are included.

Lessons incorporate graphic displays to demonstrate one-to-one correspondence, classify objects, associate numerals with sets, name ordinal numbers and group by tens.

Counting, multiples, place value, factors, square numbers, primes, GCF, LCM, expanded and exponential forms of decimal numbers, powers and exponents, number bases, scientific notation and square root concepts are the focus of

RATIO, PROPORTION, PERCENT

The Ratio, Proportion, Percent Strand is currently being programmed for grade levels 5 through 8 to extend the scope of the existing strands.

Ratio, Proportion, Percent lessons are comprised of an instructional sequence as well as guided drill and practice. The instructional sequence includes explanatory material and non-scored examples for the student. Within the self-paced lessons students receive immediate feedback, assistance with errors (hint routines), and computation scratchpads where appropriate. Graphics are incorporated to demonstrate such concepts as equivalent ratios and the definition of percent. A student report is automatically displayed at the conclusion of each lesson. This progress report shows the student's score, the number of items worked, the number correct on the second attempt. Data pertaining to subskills contained within a lesson are provided for more specific diagnosis and prescription by the teacher.

The scope and sequence of skills within each grade level provides for a gradual increase in skill difficulty and corresponds closely to DISD Baseline objectives. Approximately 20 lessons per grade level address the skills listed below.

Level 5 Skills

Write a ratio to compare the number of elements in two sets.
Write a ratio using a list of items.
Write a ratio in fractional form.
Write an equivalent ratio using multiplication.
Recognize equivalent ratios.
Determine the missing number in two equivalent ratios.
Reduce a ratio to lowest terms.
Write and reduce a ratio, given a word phrase.
Write an equivalent ratio with 100 in the denominator.
Write an equivalent ratio with 100 in the denominator as a decimal or percent.
Determine the larger of two ratios by comparing percents.
Write a decimal as a fraction and percent.
Determine the larger of two decimals by comparing percents.
Determine the larger of a fractional ratio and a decimal by comparing percents.
Write a percent in fractional and decimal form.

Level 6 Skills

Write a ratio to compare the number of elements in two sets.
Write a ratio using three different notations.
Write a ratio using sets or lists.
Write an equivalent ratio using multiplication.
Determine the missing number in two equivalent ratios.
Recognize two equivalent ratios.
Determine if two ratios form a proportion using cross multiplication.
Solve a proportion.
Write a word ratio and solve a proportion for a word problem.
Write a word ratio and select a proportion for a word problem.
Write a ratio with denominator 100 as a decimal and percent.
Change a fraction or decimal to a percent.

Compare a fraction and a decimal by comparing percents.
Solve percent problems for the percentage using multiplication of decimals, given the base and the rate.
Solve percent problems for the percentage using multiplication of fractions, given the base and the rate.
Solve word problems involving finding the percent of a number.

Level 7 Skills

Write a ratio using three different notations.
Write an equivalent ratio using multiplication or division.
Recognize equivalent ratios.
Determine if two ratios form a proportion using cross multiplication.
Solve a proportion.
Write a word ratio and proportion for a word problem.
Solve a word problem using a proportion.
Write a fraction as a percent or decimal.
Solve percent word problems for the percentage, given the base and the rate.
Solve percent word problems for the rate, given the percentage and the base.
Solve percent word problems for the base, given the percentage and the rate.
Solve percent word problems for the percentage, base, or rate, given the other two.

Level 8 Skills

Write a ratio using three different notations.
Write and equivalent ratio using multiplication or division.
Determine if two ratios form a proportion using cross multiplication.
Solve a proportion.
Solve word problems using proportions.
Write percents as decimals and decimals as percents.
Write percents as fractions in lowest terms and fractions as percents.
Solve percent word problems using fractions or decimals.
Solve percent word problems for the percentage, base, or rate, given the other two.
Solve multi-step percent word problems involving increases or decreases.

dallas independent school district

Instructional Technology

Department of Curriculum Development

# MICROCOMPUTER READING PROGRAM (MCRP)

Given the existing DISD Baseline of identified skills and current state-adopted texts, the Instructional Technology curriculum writers are developing a CAI reading program. The target population is those students enrolled in grades three through six who are reading one to two years below grade level and thus need remediation.

Using the Baseline levels as a guide, the following four strands were identified: (1)phonics, (2)structural analysis, (3)vocabulary, and (4)comprehension. Extensive research was conducted, classroom observations were made, and a systems approach was used to devise hierarchies for four levels.

Skills are divided by levels to ensure appropriate student placement for remediation; however, the emphasis is placed on the skill, not the level. Lessons are not designed to replace the teacher, but to supplement classroom instruction as needed for remediation and reinforcement. At each level, the student is expected to satisfactorily perform the skills taught in each lesson prior to movement to the next skill. The teacher has flexibility in directing the student's movement through the lessons; specific objectives enable division of and progressive student movement through subskills and skills for each level. Entry behaviors are defined, and increasingly sophisticated degrees of a skill are presented throughout each level. Recommendations for progression are made on a report screen following each lesson, allowing for enrichment, practice, or remediation. Performance objectives are delineated for each strand and within each strand to ensure appropriate progression. The major instructional goal at each level is always a demonstration of the student's comprehension of the skills taught within the lessons.

To facilitate both the writing and programming of lessons, areas of standardization have been defined. In addition, there have been developed an indexed graphics library and an extensive audio list to be used in presenting the described lessons.

The overall goal of this project then is to produce a clean and interesting format which will teach the basic skills outlined in the hierarchies. A systems approach is being used to clarify the task and ensure its successful completion.

MCRP/Skill Development by Level

| Strand | Skill | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| Vocabulary | Sight vocabulary | X | X | X |
| | Context clues: familiar words | X | X | X |
| | Context clues: unfamiliar words | X | X | X |
| | Synonyms and antonyms | X | X | X |
| | Homonyms and homographs | X | X | X |
| | Identification: common relationships | X | X | X |
| | Context clues: multiple meanings | | X | X |
| | Order, time, number, cause/effect, comparison/contrast | | | X |
| Phonics | Capital/small letters | X | | |
| | Beginning consonant sounds: one letter | X | | |
| | Final consonant sounds | X | | |
| | CVC patterns | X | | |
| | CVCe patterns | X | | |
| | Beginning consonant sounds: two letters | X | | |
| | Beginning consonant sounds: three letters | | X | |
| | Long vowels: ai, ay, ea, ee, oa, ow | | X | |
| | Dipthongs: oi, oy, ow, ou | | X | |
| | Sounds s/k for spelling of c | | X | |
| | Sounds g/j for spelling of g | | X | |
| | Endings: vowel + ck, ld, nd, mp, st | | X | |
| | Sounds of oo and ow | | | X |
| | Sound of y | | | X |
| | au, aw, al (c) combinations | | | X |
| | Vowels followed by r | | | X |
| | Long i (igh)/Long a (eigh) | | | X |
| | Silent letters: gn, kn, mb, wr | | | X |
| Structural Analysis | -s, -es/ing endings | X | | |
| | Compound words | X | X | X |
| | Contractions | X | X | X |
| | Terminal punctuation | X | | |
| | Base words | | X | |
| | Syllabication: VC:CV, V:Cle, :Cle patterns | | X | |
| | Syllabication: 3 + syllables | | | X |
| | Noun plurals | | X | X |
| | Verb tense | | X | X |
| | Comparatives | | X | X |
| | Adverb -ly | | X | X |
| | Possessives/plurals | | X | X |
| | Prefixes | | X | X |
| | Suffixes | | X | X |
| Comprehension | Detail | X | X | X |
| | Sequence | X | X | X |
| | Main idea | X | X | X |
| | Predicting outcome | X | X | X |

# COMPUTER-ASSISTED READING SKILLS

## Title IV-C (CARS)

### Overview

The Computer-Assisted Reading Skills program is a developmental project that utilizes computer-assisted instruction for students in grades four through six. The program is aimed at supplementing and reinforcing those skills that have been assessed deficient. It also provides immediate and non-threatening assistance for those students who are experiencing difficulty.

After identifying and categorizing the higher order reading skills, the following were selected for future development:

1. Identifying Fact and Opinion
2. Drawing Conclusions
3. Forming Generalizations

The curriculum supports the DISD Communications Baseline. It is consistent with reading textbooks, while presenting reading comprehension skills in greater detail. It is based upon current research in reading comprehension, the State essential objectives, and the DISD Baseline objectives.

Learning modules in the area of fact and opinion will include a variety of prerequisite skills such as: defining details, using key words, and determining point of view. Many subskills developed in the three major strands will overlap and are interrelated. It is not intended that students master these skills in isolation, but learn to integrate them so that they can better comprehend what they read.

### Lesson Design

The lesson format is designed to offer teachers a flexible teaching tool. This format can also be adapted to fit the diverse learning styles and needs of students. The basic lesson format is comprised of the following components:

a. Comprehensive instruction followed by drill and practice
b. Abbreviated instruction (Synopsis) followed by drill and practice
c. Drill and practice alone

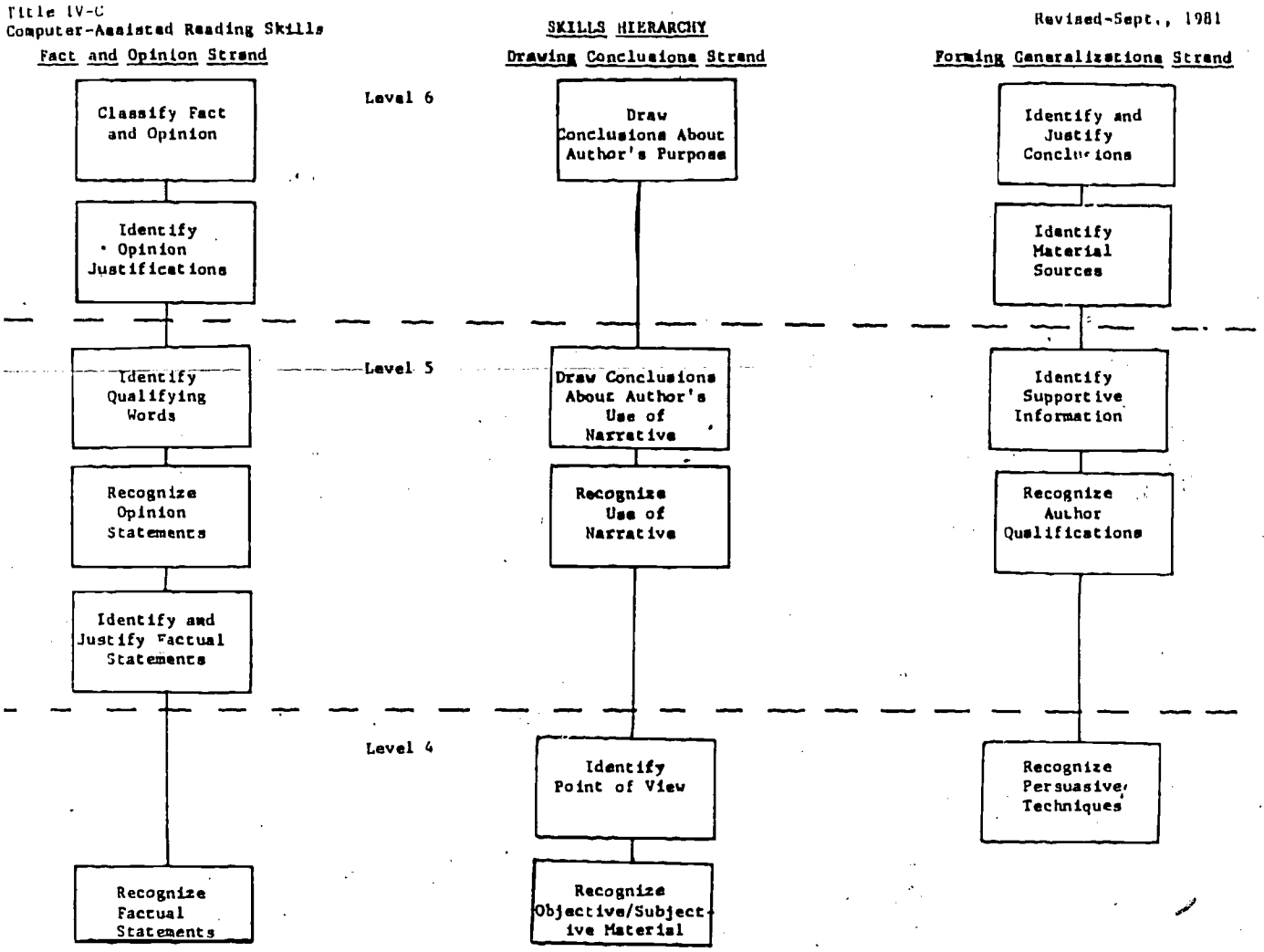
The teacher has the option of selecting one or any combination of these components for each learning session.

The microcomputer presents instruction, generates items for student response, reinforces correct answers, and tracks student progress through the lesson. A student report is automatically displayed at the conclusion of a lesson. The report provides the teacher with detailed feedback of student performance. It includes a breakout of student correct/incorrect responses to specific subskills within the lesson. A placement system utilizing criterion-referenced test items will be incorporated into the curriculum.

An effective use of colorful screens and border designs is utilized throughout the lesson development phase of the program. Additionally, the instructional segment and related lesson development sections are interspersed with appealing graphic representations.

Lesson Objectives

Several higher-order reading comprehension skills and sub-skills on which students tested poorly have been identified. Objectives designed to strengthen those skills have been delineated for lesson module development.



Computer-Assisted Mathematics Skills:
Lesson Design and Development

This Title IV-C project incorporates a systematic approach to the design of instruction for microcomputer-based curriculum on mathematical problem solving skills. The project curriculum is aimed at supplementing and reinforcing concepts and skills presented through regular classroom instruction in grades four through six. After identifying and categorizing problem solving skills, the strand Word Problems was selected for lesson development.

A heuristic problem solving process has been developed and its components permeate the objectives of the Word Problem Strand. Principal elements of the process are vocabulary interpretation from a mathematical standpoint, question isolation, information location, computational skill identification, estimation, computation, and solution verification. Lessons address those components in both isolated and integrated situations.

The lesson format is designed to provide optimum flexibility for diverse student needs. Each lesson contains a comprehensive instructional sequence, an abbreviated instructional sequence (synopsis), and drill practice. Users can select any one or a combination of those lesson components. The microcomputer presents instruction, generates random problems for student solution, reinforces correct responses, provides correction and explanation of errors, and tracks student progress through the lesson. Performance reports provide general and detailed summaries of student progress.

Project personnel have specified areas of standardization for curriculum implementation on a microcomputer. These areas include a sign-on procedure, decision rules for number of tries, messages, scoring report formats, special function keys, and color and character sets. An indexed graphics library has also been developed to expedite computer generation of content related visuals.

Level 4 Lesson Objectives

Objective: Analyze and solve one-step word problems involving addition or subtraction concepts.

401 Fill in the facts and identify a paraphrased question to form a mini-problem for a given word problem.

402 Select information in picture or word form that is needed to answer a question involving addition or subtraction concepts.

403 Select a question that can be answered for a given situation.

404 Select and solve an addition or subtraction open sentence corresponding to a word problem, given three choices.

405 Write and solve an addition or subtraction open sentence corresponding to a given word problem.

406 Determine whether or not a word problem has been solved correctly, and if not, determine the kind of error that has been made.

407 Select the answer to a given word problem involving addition or subtraction concepts.

408 Classify a statement about a given situation as true or false.

Objective: Analyze and solve one-step word problems involving missing addend concepts.

409 Complete a diagram corresponding to a given addition or subtraction word problem by supplying given information and by matching items one-to-one.

410 Select and solve an addition or subtraction open sentence corresponding to a given word problem.

Objective: Estimate answers to one-step word problems involving addition or subtraction concepts.

411 Select the estimated answer to a given word problem involving addition or subtraction concepts.

Objective: Analyze and solve multi-step word problems involving addition and/or subtraction concepts.

412 Solve a given multi-step word problem by answering intermediate questions and the concluding question.

413 Solve a given multi-step word problem by selecting and answering intermediate questions and the concluding question.

ARKANSAS DEPARTMENT OF EDUCATION

SARA MURPHY

ASSOCIATE DIRECTOR, COMMUNICATIONS

# REGIONAL SAMPLER:

# REPORTS FROM FOUR STATE EDUCATION AGENCIES

Prepared for

Conference on Microcomputers
Southwest Educational Development Laboratory

by

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Associate Director
Arkansas Department of Education

Austin, Texas

October 5, 1981

If educators wait three to ten years to use computers in the educational process, public education will be out of business, according to Earl Joseph, who is one of the national authorities on the use of computers. Ready or not, Arkansas educators are jumping into the use of microcomputers with surprisingly rapidity so it looks like we're here to stay.

At least 1,000 microcomputers are in use in Arkansas schools this year, according to the records of two major suppliers of microcomputers in the state and state business education office estimates. A survey done in February, 1980, by the Arkansas Department of Education on microcomputer use uncovered only 15 in the schools which responded.

This year's estimate includes one that was purchased over the counter at the Economy Drug Store in Huntsville by the Lingston superintendent. It also includes one that was built by a high school class at Big Flat. The teacher, a former electrical engineer, started with an old television set and some ordered parts and helped the class build a workable microcomputer for $300. He disassembled it at the end of the school year so that this year's class can built it all over again.

The two suppliers interviewed were Educators Consultant Services and Beardsley's Educational Consultant Services. In addition, information was gathered from within the Department of Education and the school districts

Dr. Roger Lewis, with Educators Consultant Services, estimates that about 15 percent of the school districts in Arkansas now have microcomputers and that percentage may be low. His company, however, has placed more than 500 Commodore PETS and more than 50 Bell and Howell Apples, for a total of 550. Another major supply house, Beardsley's, has placed more than 100 Texas Instruments microcomputers in the schools. Mrs. Tommie Butler, business education supervisor, estimates at least another 300 to 400 Radio Shack TRS 80 computers are in use in high school classes. No central data was available from all the Radio Shack stores in the state.

Dr. Lewis said that microcomputers are being used in three areas in the schools:

1. Computer assisted instruction in math, language arts and reading in the lower grades and computer managed instruction in which the students are not directly involved with computers.

2. Computer science and literacy courses on the high school and junior high school levels.

3. Instruction in information processing in business education.

E. R. Jennings of Beardsley's School Supply said that the chief problems in using microcomputers were (1) the lack of instructional software which had built in accountability and (2) the incompatibility of one type of microcomputer with another. Some use tapes, some floppy dics and some a program pack or common module. His company has used Scott Foresman software which can offer a criterion-referenced management system in math but is still two years away from having it ready in reading.

At least one of the ways to begin to solve the software problem is to evaluate what is available and match it to objectives which need to be taught, according to Charles Watson, an administrator supervisor at the

Department of Education who is now getting his doctorate in math education. When Charles returns to the Department later this year, he plans to set up workshops with teachers evaluating available software and developing a system for matching it to performance objectives in the basic skills established by the state.

Another way is to write your own programs so that a math is assured. Fourth grade students at Gibbs Schools in Little Rock are doing that under the expert guidance of Barbara Harrison, their teacher, who has a private foundation grant to expand the use of computers in elementary classrooms. Rounding numbers, for instance, is a critical skills for fourth graders who wish to become fifth graders and Mrs. Harrison's class has written its own computer program and put it in the micro for teaching this skill. This insures an internalization of this rationale for rounding numbers as well as a way to practice this skill on the computer.

The Little Rock School District has 60 microcomputers in a variety of classroom uses, including those in Barbara Harrison's room, ranging from enriched junior high classes for the gifted to Title I labs for slow learners. Jim Hardwicke, a math curriculum supervisor in the district, said it is not unusual in elementary classrooms for the slowest student and the most gifted student to be seated side by side working lessons on the microcomputers in an elementary classroom.

The junior high program in advanced algebra classes involves learning how to use algebra in computer programming. It has required a downshifting of the teaching of algebra concepts to the seventh and eighth grades so that the computer programming can be used in the ninth. Each of the seven junior high schools will eventually have three computers each in each of the advanced algebra classrooms. Students have even been going door to door selling

Christmas wrapping paper to buy computers for the schools and PTA's have taken on the chore of raising money for them too.

A new project beginning in the Jonesboro School District will center on using the microcomputer as a tool for instructional management so that a teacher can have quick access to data about each student's strengths and weaknesses. This gives the teacher the information which is needed to adjust instruction accordingly. North Little Rock has also done some work in this area and you will be hearing more about that tomorrow in a case study report by Ray Simon.

A special project funded by the Winthrop Rockefeller Foundation at the University of Arkansas provides for the development of chemistry, physics and other high school subjects on microcomputer programs and video tapes. The video tapes and computer are synchronized so that when a wrong answer is fed into the computer the related tapes are rerun. There are lab simulations and other similar learning experiences presented on this combined program. They are designed for rural high school and overseas school use.

Frank Adcock, principal of Camden Middle School where microcomputers are in use, said the use of the computers assists through simulation, games, tutoring, drills and practice. He said that computers can supplement concepts already introduced by the teacher or can be a primary tool to introduce new concepts on which the teacher can then expand.

He said that computers are valuable because they actively involve students in the learning process and allow students to move at their own pace. Learning can be reinforced systematically by the computers and teachers are freed to devote more time to teaching. Camden used the computers in two basic math courses and added them at the elementary school level.

In a sampling of other school districts:

Huntsville offers a programming course sponsored by the mathematics department but which drew from business, science and social studies as well for its students.

Conway High School used microcomputers in algebra and trigonometry classes initially but later expanded the use to American history, drills on state capitals, geography, international time studies, photograph, remedial classes and closed circuit television announcements. The math department offers a one-semester course in programming. The career center also has three microcomputers.

The Alma School District purchased 15 microcomputers last year and has a basic computer literacy course for all students in the ninth grade and 40 students in the remaining top three grades. This program is funded by Title IV-C.

Rogers is using 12 Radio Shack microcomputers on an interdisciplinary basis through the district's media center. Both math and science teachers are involved.

Monticello and Harmony Grove are other districts which have done some pioneering work in the use of microcomputers, the latter with an International Paper Company grant.

One of the leaders in the state in getting computer courses started has been Tommie Butler, supervisor of business education in the vocational education division of the Department of Education. Mrs. Butler set up six one-week workshops over the state last summer in the use of microcomputers in business education. Ten high schools offer computer oriented accounting and 12 offer data processing although this is more related to the use of mini-computers than to micros. Mrs. Butler is attempting now to get all 150 or more schools with intensive office laboratories to install microcomputers and many of them already have.

A new educational cooperative in Southeast Arkansas, headed by Dr. Noble Gividen, is planning to initiate an effort on promoting compatability among the various microcomputers so that software which is developed can be used by all. The cooperative will also be working on developing computer literacy among school administrators.

Other uses for microcomputers have been for information storage and for financial record storage, with several of the smaller school districts finding them a cost effective alternative to hookups with large computers. When educational service centers were first planned for the state, we developed a proposal for using microcomputers in the various centers to build a promising practices file regionally which then would be fed into a state promising practices file for feeding back to all the regions. We did not get the centers or the funding but the work being done in the Southeast Educational Cooperative will undoubtedly lead into that and other creative directions.

We were impressed while gathering this data with how rapidly school districts have begun to use microcomputers and recognize our own need for a higher level of computer literacy. We are pleased to have the opportunity to participate in this conference in order that we may learn more about what is happening and what is possible in the use of microcomputers in the schools.

LOUISIANA STATE DEPARTMENT OF EDUCATION

SUE WILSON

ASSISTANT DIRECTOR OF DISSEMINATION

Louisiana State Department of Education

The Louisiana Dissemination Network (R&D) activities relative to microcomputers are as follows:

- The State Department of Education is conducting a survey to identify current computer hardware and software users and key persons involved in microcomputer use.

- The Louisiana Dissemination Network will co-sponsor a one day microcomputer conference in conjunction with the Mid-South Association for Educational Data Systems on February 18-20, 1982, in New Orleans, at the Landmark Hotel.

- Through the Louisiana Dissemination Network's programs and practices file, we are identifying the programs currently operating in the area of computer assisted instruction. Through the LDN Talent File, we are identifying persons involved in the operation of such programs.

OKLAHOMA STATE DEPARTMENT OF EDUCATION

GARY GREEN

ASSOCIATE PROFESSOR

UNIVERSITY OF OKLAHOMA

# Computer Use In Schools Surveyed

By GARY GREEN

*Dr. Green is an associate professor in the business education department of the College of Education, University of Oklahoma.*

Changes in printing techniques, calculators and audio visual equipment have all brought revolutionary adjustments to education. However, recent discoveries in electronic semiconductor technology is promoting one of the most astounding educational tools of the century—the microcomputer.

Within the last three years the microcomputer has become technologically reliable and obtainable at a price that educational institutions can afford. Microcomputers are being sold daily to hundreds of businesses, industries, and homes as well as schools. The microcomputer is no longer a fad or a craze, it has firmly established its place in the new technology of processing data.

University of Oklahoma Business Education and Educational Technology faculty members are feeling a growing awareness of the influence of microcomputers on Oklahoma education. There have been rapidly growing sales of microcomputers to Oklahoma Public Schools, and with it, growing requests for information about the product and its uses.

Several states, including Kansas, Ohio and Florida, have conducted surveys to establish information banks about microcomputer usage in their schools. In the past no such survey had been made in Oklahoma and there was no reliable source of information concerning microcomputer usage in the schools.

Such information is pertinent for educators wishing to stay abreast of new developments, to be current in instruction and to be sensitive to the populations' needs. In the fall of 1980, research was organized and conducted to document Oklahoma public school involvement with microcomputers.

## SURVEY DEVELOPED

A sample survey was developed and forwarded to a panel of microcomputer experts for review. The findings suggested that the survey should examine (1) the number of microcomputers in operation in schools, (2) brand, model and other technical information, (3) the role of the microcomputer in the school, (4) the other types of computer activities in the school, (5) the problems experienced in using the microcomputer, and (6) the need for inservice training of teachers.

Once the survey was drafted, the names and addresses of secondary public school principals were obtained from the Oklahoma State Department of Vocational Education. A total of 445 surveys were mailed (some of the small schools with only three or four teachers were deleted). To date, 206 surveys have been returned for a reply rate of [illegible] percent.

One hundred forty-nine schools reported the recent purchase of a microcomputer. If it is assumed that the schools which did not react to the survey do not have a microcomputer, then it can be recorded that approximately 33 percent of the schools in Oklahoma have microcomputers. The number of microcomputers per school is outlined in Table I.

TABLE I

| Number of Schools | Number of Microcomputers |
|---|---|
| [illegible] | 1 |
| [illegible] | 2 |
| [illegible] | 3 |
| [illegible] | 4 |
| [illegible] | 5 |
| [illegible] | 6 |
| [illegible] | 7 |
| [illegible] | 8 |
| [illegible] | 9 |
| [illegible] | 10 |
| [illegible] | 12 |
| [illegible] | 14 |
| 1 | 18 |
| 1 | 24 |

Based on personal observation, the researchers believed that there were more Radio Shack and Apple microcomputers in use than any other brand.

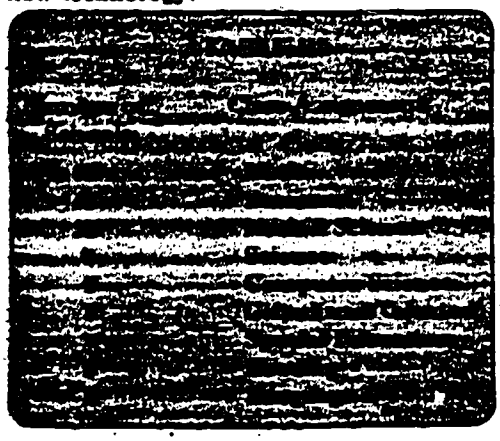
(See "Computer Use" Page 2)

(Continued From Page 1)

The survey tended to prove this assumption correct. Brands of microcomputers as well as associated equipment are enumerated in Table II.

| | | | | |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | Radio Shack TRS-80 | [illegible] | [illegible] | [illegible] |
| 27 | Apple II | 27 | 15 | 10% |
| 10 | Commodore Pet | 5 | 5 | 7% |
| 1 | ATARI | 0 | 0 | 1% |
| 2 | Texas Instruments | 2 | 2 | 5% |
| 2 | Bell & Howell | 1 | 0 | 1% |
| 0 | Hewlett Packard | 0 | 0 | 0% |
| 1 | Southwest Technical | 0 | 0 | .3% |
| 0 | OSI | 0 | 0 | 0% |
| 1 | Digitial PDP II | 1 | 1 | .7% |
| 1 | Wang | 0 | 0 | .7% |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | Underwood [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

In addition to determing the models, support equipment and number of microcomputers, the survey party was interested in learning how the microcomputers were being used. Table III outlines the present assignment of this new technology.



The majority of the reporting schools stated that more software and program materials were needed. A few stated that they needed individual instruction materials and support software materials for business education and math. Two schools requested advanced materials for use in gifted/talented programs.

Several principals stated that they would use the microcomputer for administrative purposes if they had trained personnel to make the necessary input. A large number of schools stated that they needed inservice and would attend workshops/seminars if provided.

## NEW TECHNOLOGY EXPOSED

It is exciting to learn that approximately one of every three Oklahoma secondary public schools has a microcomputer. That says something for the progressive nature of Oklahoma administrators. In addition, it can be safely assumed that more microcomputers will be purchased soon by schools which presently do not own one. It is obvious that many Oklahoma secondary youth will have the opportunity to be exposed to a new technology.

Teacher educators should review their particular speciality and analyze how this new technology can facilitate learning of subject matter. In turn, teachers should share new experiences and communicate educational instructional innovation as a result of using the new machines to provide a new avenue to educate Oklahoma youth.





UPDATE: The Oklahoma State Department of Education will issue a new survey to all 618 school districts in January, 1982. Results will be published. Meanwhile, a task force of SDE, university, and district personnel has formed to set goals and objectives regarding computer use, and to make recommendations to the state department about instructional assistance,

TEXAS EDUCATION AGENCY

GARY HASELOFF

EDUCATION SPECIALIST

## EXECUTIVE SUMMARY

Preliminary Report
of the
Committee on Computers in Education
Submitted to
The Deputy Commissioner for Planning,
Accreditation, and Professional and Program
Development

April 7, 1981

The proliferation of computers in Texas schools has been rapid and dramatic. The Texas Education Agency has not made a concerted effort to develop its role in providing leadership to local schools.

In December 1980, the Deputy Commissioner for Planning, Accreditation, and Professional and Program Development formed an ad hoc committee representing the departments under her supervision to develop short- and long-range objectives and to propose actions to reach these objectives. The committee has studied the literature, interviewed school and service center personnel and other specialists who are working in the computer instructional field, developed some knowledge of the technology, with hands-on experience, and prepared a preliminary report for the Deputy which

- identifies problems and needs confronting Texas school districts, education service centers, and the Agency, and
- recommends immediate actions which will begin to address the problems and needs, and which will move toward development of long-range objectives and the formulation of a plan for reaching these objectives.

### PROBLEMS AND NEEDS

The major problems and needs identified by the Committee on Computers in Education affect both students and staff in the educational setting. They are interactive and complex. Among them are the following:

- rapid proliferation of computers in schools
- inappropriate uses of computers in the school setting
- need for guidance, information, and technical assistance regarding acquisition and use
- impact of untrained administrators and teachers
- inadequacy of evaluative data regarding their effectiveness
- rapid changes in the industry itself
- limited Agency involvement
- paperwork burdens on teachers and accountability

## RECOMMENDED OBJECTIVES AND ACTIONS

1. *The Agency will improve the level of awareness and understanding in the state department staff and the State Board of Education.*

   - The Committee should be expanded to include broader Agency representation. Inservice training should be offered to Agency staff in curriculum and instruction, and in approval, evaluation, and technical support of instruction using computers.

   - An awareness session should be planned for members of the State Board of Education.

   - Internal channels for communication should be used to report the work of the Committee.

   - The Agency staff should have access to resource materials on computer instruction in the library, and also have a demonstration center for hands-on experiences with computers and courseware.

2. *The Agency will review the guidelines and criteria for computer acquisition and use for programs where the Agency has approval responsibility, and will survey the use of computers in [illegible]al districts.*

   - The enlarged Committee should locate and collect information from Agency program managers regarding computer acquisition by school districts.

   - The Committee should review guidelines and criteria with the program managers to determine that these are consistent with accreditation standards and "good practices."

   - The Agency should plan for data collection from school districts that are using computers in instruction.

3. *The Agency will improve the competence of the Agency and ESC staffs to provide technical assistance to school districts.*

   - The Agency and service center executive directors, through the Planning Council, should make a commitment to continue and expand the development of staff competence.

   - The Agency and the Planning Council should explore possible roles the Agency should assume to ensure exchange of ideas, information, materials, and training.

   - The Agency should use other planning and dissemination mechanisms available with ESCs to discuss issues in computer-based instruction.

   - The staff of the Agency and the regional centers should systematically study the software for instruction and for management of instruction, seeking evaluative information which can be exchanged.

4. *To remain current and to provide leadership, the Agency will become involved at the state and national level with other agencies and organizations.*

   - Agency divisions or individual staff members should be assigned to interact with federal and state agencies, with Texas institutions and professional societies to remain current with activities in computer use in education.

   - Agency staff should continue visiting programs of special interest in Texas and other states to remain abreast of educational applications of computer technology.

5. *The Agency will develop frameworks or models for evaluating computer use in instruction and for evaluating instructional software.*

   - With the ESCs, the Agency should locate models or develop models for evaluating the use of computers in education used as instructional tools, as the object of instruction, and as administrative/management tools both in the classroom and in centralized locations. Both product and process evaluations should be addressed. When used as an instructional tool, the computer should be evaluated in terms of student outcomes and cost/effectiveness.

   - With the ESCs, the Agency should locate or develop models or frameworks for evaluating instructional software.

   - As a spinoff from these evaluation frameworks, selection criteria for hardware and software should be identified for district use in decisionmaking before purchase.

   - These models or frameworks, and the selection criteria should be disseminated to ESCs and local districts, and Agency staff should be able to give technical assistance in their use.

6. *The Agency should review State Board of Education policies to determine implications for effective use of computers in instruction.*

   - Policies regarding instructional resources, accreditation, textbook adoption, and other related systems in which computer instruction may be used should be examined and a report made of modifications and additions recommended. These recommendations should serve as background for long-range objectives regarding computers in instruction, and when adopted, serve as a policy base on which the Agency can operate in a leadership role.

7. *The Agency will investigate the implications upon the public school curriculum of computers in the home, school, business, industry, and professions.*

- The Agency staff should study practices in Texas schools and in other states regarding curriculums about computers and those using computers, and should develop suggestions for desired student outcomes, and describe or define computer literacy.

- The Agency staff should explore career information on computer science and technology to be made available to students through curriculum.

- The Agency staff should disseminate to school districts a report on curricular implications of computer use in instruction, and the staff inservice education needed.

8. *The Agency will identify activities desired by local school districts to increase the knowledge about the effective use of computers.*

   - The Agency should use the existing opportunities for exchange and interaction with local school officials in summer conferences and regular meetings of councils and panels.

   - The Agency staff, through workshops, etc., should provide information and technical assistance to local school officials of state and federal programs such as Title IVC, Title I, State Compensatory, Special Education, and Talented and Gifted.

9. *The Agency will establish a structure and process to address the identified problems and needs.*

   - The Agency should develop a management plan for giving state leadership and direction to instructional uses of computer technology, with long-range objectives, assigned roles and responsibilities, and commitment of resources.

   - The staff should explore possible savings to local districts through state agreements with vendors.

   - Accounting questions about computer hardware and software should be answered and procedures explained in Bulletin 679.

In addition to the Executive Summary, the entire Preliminary Report is available, along with Appendices prepared by individual members of the Committee, providing background, point of view, and arguments for action. These papers are on the following subjects:

- Staff Development: TEA/ESC
- Survey of Computers in Use in LEAs
- Education Service Centers in Cooperation with TEA
- Role of Computers in Education
- Evaluation of Computer-Based Instructional Materials
- SBOE Policy Formulation
- Computers as Instructional Resources
- Agency Management and Resources

R&D SPEAKS:

# MICROCOMPUTERS & EDUCATION

OCTOBER 5-7, 1981

SOUTHWEST EDUCATIONAL DEVELOPMENT LABORATORY

# GOALS

1. To provide a forum for enumerating and discussing major issues important to the uses of microcomputers in education.
2. To increase awareness about two specific issues, teacher training in microcomputer use and the evaluation of compter-based instructional materials.
3. To provide an opportunity for sharing information about the uses of microcomputers at both the state education agency and the local school district levels in Arkansas, Louisiana, Mississippi, New Mexico, Oklahoma, and Texas.
4. To consider the need for creating a regional clearinghouse for information on microcomputers in education.

# AGENDA

Monday
October 5, 1981
*Fifth Floor Conference Room*

1:00 - 1:45 pm — Registration
Get Acquainted Refreshments

1:45 - 2:15 pm — Introductions

James H. Perry, Executive Director, SEDL
Preston C. Kronkosky, Deputy Executive Director, SEDL
Nancy Baker Jones, Conference Coordinator

2:15 - 3:00 pm — Keynote Address

Robert Taylor, Coordinator
Program in Computing in Education
Teachers College, Columbia University

3:00 - 3:15 pm — Break

3:15 - 4:00 pm — Issues Panel

Cheryl Anderson, University of Texas at Austin
Vicki Blum, Teachers College, Columbia University
Sandy Pratscher, Region XIII, Education Service Center
James Poirot, North Texas State University
Patricia Sturdivant, Region IV, Education Service Center
Robert Taylor, Teachers College, Columbia University

Nancy Baker Jones, SEDL/RX, Moderator

4:00 - 4:15 pm — Break

4:15 - 5:15 pm — The SEA Perspective in the SEDL/RX Region

Alan Evans, Assistant Director, Instructional Services, Mississippi State Dept. of Education
Gary Green, College of Education, University of Oklahoma
Gary Haseloff, Education Specialist, Texas Education Agency
Sara Murphy, Associate Director, Communications, Arkansas State Department of Education
Bill Trujillo, Math Specialist, New Mexico State Department of Education
Sue Wilson, Assistant Director of Dissemination, Louisiana State Department of Education

Anna Penn Hundley, SEDL/RX, Moderator

5:15 - 6:30 pm — Social Hour
*Second Floor Board Room*



VENDOR DISPLAY TAKES PLACE CONTINUOUSLY ON THE EAST SIDE OF THE 5TH FLOOR

Tuesday
October 6, 1981

8:00 - 8:30 am — Coffee & Conversation
*Fifth Floor Conference Room*

8:30 - 12:00 noon — What Schools in the SEDL/RX Region Are Doing

| *Second Floor Conference Room* | *Fifth Floor Conference Room* |
|---|---|
| *8:30 - 9:30 am* | *8:30 - 9:30 am* |
| Raymond Simon, Director<br>Computer Services<br>North Little Rock Public Schls.<br>North Little Rock, Arkansas | Shirley McCandless, Director<br>Management Information Systems<br>Louisiana State Department of Education<br>Baton Rouge, Louisiana |
| Overview of all programs K-12 | Selected programs around the state K-12 |
| *9:30 - 9:45 change sessions* | *9:30 - 9:45 change sessions* |
| *9:45 - 10:45 am* | *9:45 - 10:15 am* |
| Jim Day, Director of Computer Activities & Math Curriculum<br>Bloomfield High School<br>Bloomfield, New Mexico | Vicki Smith, Curriculum Writer, Instructional Technology<br>Kramer School, Dallas ISD<br>Dallas, Texas |
| Math management system K-12 | Microcomputer Reading Program (MCRP) Elem. |
| *(Bloomfield High School continues)* | *10:15 - 10:45 am* |
| | John Newport, Editor; Bill Martinez, Senior Computer Programmer; Cheryl Lani H. de Juarez, ESL Specialist; Beatriz Beltran, Coordinator<br>Curriculum Development Department<br>Dallas Independent School District<br>Dallas, Texas |
| | Computer Assisted Spanish/English Transition Sequence (CASETS) 7-8 |
| *10:45 - 11:00 change sessions* | *10:45 - 11:00 change sessions* |
| *11:00 - 11:30 am* | *11:00 - 12:00 noon* |
| Betty White, Computer Proctor & Remedial Mathematics Teacher<br>Humphreys County School System<br>Belzoni, Mississippi | Sybil Connolly, Director<br>Media Center<br>Windsor Hills Elementary<br>Putnam City, Oklahoma |
| CAI in math & reading 4-5 | The computer in the library K-6 |
| *11:30 - 12:00 noon* | *(Putnam City Oklahoma continues)* |
| Susan Purcer, Secondary Curriculum Coordinator<br>Jackson Public Schools<br>Jackson, Mississippi | |
| Variety of subjects K-12 | |

| | | |
|---|---|---|
| 12:00 - 1:30 pm | | Lunch on Your Own |
| 1:30 - 3:00 pm | | The Evaluation of Instructional Courseware: The MicroSIFT Approach |
| | Patricia Sturdivant<br>Region IV, Education Service Center<br>Houston, Texas | |
| 3:00 - 3:15 pm | | Break |
| 3:15 - 4:45 pm | | The Evaluation of Instructional Courseware: The EPIE Approach |
| | Vicki Blum<br>Teachers College, Columbia University<br>New York, New York | |
| 4:45 pm | | Adjourn |

## Wednesday
## October 7, 1981
*Fifth Floor Conference Room*

| | | |
|---|---|---|
| 7:30 - 8:00 am | | Coffee & Conversation |
| 8:00 - 10:00 am | | Teacher Preparation & Training |
| | Sandy Pratscher<br>Region XIII, Education Service Center<br>Austin, Texas | |
| 10:00 - 10:15 am | | Break |
| 10:15 - 11:15 am | | Large Group Work Session: Should We Create a Regional Clearinghouse for Computer Information? |
| | Nancy Baker Jones, SEDL/RX, Moderator | |
| 11:15 - 12:00 noon | | Conference Wrap Up, Evaluation, Reimbursement Procedures |
| Noon | | Adjourn |

# PRESENTERS

CHERYL ANDERSON — Dr. Anderson is Assistant Professor of Media Education, The University of Texas at Austin. She is involved in the training of inservice and preservice teachers about computers. In 1980 she established a microcomputer lab in the College of Education and developed two courses introducing the use of computers in education.

VICKI BLUM — Ms. Blum is a doctoral candidate at Teachers College, Columbia University. Using criteria developed by the Educational Products Information Exchange (EPIE), she has trained analysts in the evaluation of commercially produced instructional courseware for microcomputers. An examination of the evaluation process will be part of her doctoral thesis.

JAMES POIROT — Dr. Poirot is chair of the Computer Sciences Department, North Texas State University, Denton. He is the author of several books and articles, among them COMPUTER LITERACY and COMPUTERS AND EDUCATION. He is also a co-author, with Dr. Robert Taylor, of "Teacher Education," a discussion of computing competencies needed by teachers.

SANDY PRATSCHER — Ms. Pratscher is Mathematics/Computer Science Consultant, Region XIII Education Service Center, Austin, Texas. As such, she manages the service center's microcomputer laboratory, provides staff development activities in computer based instruction, and develops and aids school districts in evaluating software.

PATRICIA STURDIVANT — Ms. Sturdivant is coordinator of computer-based instruction at the Region IV Education Service Center, Houston, Texas. As such she coordinates instructional computing services for teachers, curriculum specialists, and administrators in 101 school districts in Texas. She has managed the acquisition of computers for a large network, including 900 microcomputers, 12 minicomputers, and 500 time sharing terminals. She is also a member of the MicroSIFT network.

ROBERT P. TAYLOR — Dr. Taylor is the coordinator of the Program in Computing and Education, Teachers College, Columbia University, New York. Begun in 1975, the Program in Computing is designed to develop computing competence in teachers and other educators regardless of their academic specialty. Widely published, Dr. Taylor is the editor of the recently published THE COMPUTER IN THE SCHOOL: TUTOR, TOOL, TUTEE, a collection of essays by five pioneers in the field of computers in education.

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# RESOURCES

*Books*

Billings, Karen, and David Moursund, ARE YOU COMPUTER LITERATE? (Beaverton, Oregon: dilithium Press, 1979) $8.95.

Papert, Seymour, MINDSTORMS: CHILDREN, COMPUTERS, AND POWERFUL IDEAS (New York: Basic Books, Inc., 1979) $12.95.

Poirot, James L., COMPUTERS AND EDUCATION (Manchaca, Texas: Sterling Swift Publishing Co., 1979) $6.95.

Taylor, Robert, ed., THE COMPUTER IN THE SCHOOL: TUTOR, TOOL, TUTEE (New York: Teachers College Press, 1980) $14.95.

Willis, Jerry, with Deborrah Smithy and Brian Hyndman, PEANUT BUTTER AND JELLY GUIDE TO COMPUTERS (Beaverton, Oregon: dilithium Press, 1978) $9.95.

*Periodicals*

AEDS JOURNAL, a publication of the Association for Educational Data Systems, 1201 16th St. NW, Washington, DC 20036, quarterly, $25/year.

CREATIVE COMPUTING, P.O. Box 789-M, Morristown, New Jersey 07960, $20/year.

COMPUTERTOWN USA!, P.O. Box E, Menlo Park, CA 94025, newsbulletin, monthly, free.

THE COMPUTING TEACHER, a publication of the International Council for Computers in Education, c/o Howard Bailey, Eastern Oregon State College, La Grande, Oregon, 97850, $14.50/year ($12.50/year with membership in the Texas Computer Education Association, whose annual dues are $10.00), published 9 times a year.

EDUCATIONAL TECHNOLOGY, 140 Sylvan Avenue, Englewood Cliffs, New Jersey 07632, monthly, $49/year.

*Note: the resources cited above represent some places to start, since there are literally thousands of resources about computers and education.*

CONFERENCE EVALUATION

REGIONAL EXCHANGE

# PARTICIPANT QUESTIONNAIRE

1. I represent my 19 SEA ___ IEA 2 LEA 1 HEA 6 Other.

2. 4 ☐ I am a teacher.
   6 ☐ I train teachers.
   4 ☐ I train those who train teachers.
   15 ☐ I have more administrative responsibilities than training responsibilities.
   9 ☐ Other *(See next page)*

3. This conference will assist me in:

   9 ☐ teaching.
   15 ☐ conducting inservice.
   13 ☐ training others to conduct inservice.
   12 ☐ other *(See next page)*

4. The program objectives were:

   well defined 5 4 3 2 1 vague
   19 10 4

5. The program objectives were attained

   fully 5 4 3 2 1 not at all
   13 17 3

6. The program climate promoted freedom of expression.

   agree 5 4 3 2 1 disagree
   24 9

7. The program format facilitated learning.

   agree 5 4 3 2 1 disagree
   20 10 2 1

8. The information provided at the conference is applicable to my work.

   just what I need 5 4 3 2 1 useless
   14 14 5

9. The amount of information provided at the conference was:

   1 ☐ too much 31 ☐ sufficient 1 ☐ insufficient

10. The information provided at the conference was:

    ☐ too complex 32 ☐ appropriate 1 ☐ too simple

11. The time allowed to cover the material at this conference was:

    ☐ too much 21 ☐ sufficient 12 ☐ insufficient

*This conference has been a tremendous benefit to me as an administrator in a public school. However, my personal needs may differ from conference objectives. Some sessions a bit long. Very good!*

*Excellent. This has been the best conference I have attended in years. Depends on how you define learning.*

*Great. I need to go home and expand upon the info.*

*I just hope I can retain it.*

*As a novice in this area, it does tend to threaten me a little.*

*There is never enough time (3). Not enough time for vendors*

12. The time allowed to ask questions was:

☐ too much *30* ☐ sufficient *3* ☐ insufficient

13. I recommend this conference to others.

strongly agree 5 4 3 2 1 strongly disagree
*21* *10* *2*

14. I would like a follow-up conference on this subject in my state.

strongly agree 5 4 3 2 1 strongly disagree
*19* *5* *3* *1*

15. If you would like a follow-up conference on this subject in your state, please give the name, agency/office, and telephone number of the person with whom the SEDL/RX should be in touch for further discussion. (No commitment on your agency's part will be implied.)

*20 participants provided names of contact people*

16. I plan to share information gained in this conference with

*24 participants provided 24 names, plus categories of people (teachers, fellow workers, administrators, university personnel, and "anyone who asks").*
(name) (title) (agency)

17. I want more information about *(see next page)*

18. The purpose of the Regional Exchange is to *(see next page)*

19. Comments: *(see next page)*



*The Regional Exchange is one of seven projects nationwide, funded by the National Institute of Education to disseminate the results of educational research to practitioners. Contact the Regional Exchange at: Southwest*

2. *Other duties:*

*Information resources, some training*
*Mathematics specialist*
*R&D*
*Data processing and ad hoc committee on computers*
*Design microcomputer curriculum*
*Information services for educators*
*Educational consulting*
*Workshop planning*

3. *Other areas in which conference will assist:*

*Committee responsibilities*
*Defining the trend in computer-based instruction*
*Becoming aware of the impact microcomputers are having and are expected to have on instructional programs at the local level of several states*
*Understanding the state of progress or leadership in other states*
*Sharing with others about what is available*
*R&D planning and implementation*
*Ad hoc committee*
*Identifying needs of other educators and forming communication lines among others in this region*
*Being aware of programs which utilize microcomputers and some of the related issues or problems*
*Organizing a computer-in-education program on a statewide basis*
*Awareness and obtaining information for resource center*
*Providing leadership and focus in bringing microcomputers into education*
*Policy decisions*
*Designing computer facilities for instruction*
*Dissemination*

17. *I want more information about:*

*Exemplary programs and practices for handicapped learners*
*Computer managed instruction*
*Staff inservice*
*Staff inservice training for SDE personnel and evaluation procedures for appropriate software*
*Selecting the appropriate microcomputer for a school district*
*Training*
*Microcomputer software and hardware*
*Staff development and software evaluation*
*Elementary level instruction on computers for students*
*What you are going to do next, how you can best help us*
*Micro computer consumerism*
*Teacher training*
*Area workshops*
*Minnesota's state microcomputer program*
*SEAs activities in this area; Results of RAI school surveys*

18. *The purpose of the Regional Exchange is to:*

*Bridge the gap between research and practice*
*Exchange and dissemination of information*
*Disseminate information for program improvement*
*Disseminate information*
*Exchange information*
*Promote and support information and communication among states in the region*
*Spread research*
*Help us!*
*Disseminate educational research*
*Share ideas, resources, techniques, etc.*
*Disseminate educational data*
*Disseminate information*
*Help educators provide leadership in the infusion of microcomputers into our instructional programs*
*Disseminate the results of educational research to practitioners*
*Facilitate and expedite*
*Act as liaison among states attending, in order to provide information not currently available about instructional topics*
*Disseminate research to practitioners in six state region*

19. *Comments:*

*This conference was very worthwhile. As a result of attending, I believe the Oklahoma team can return with considerable direction and prepared "to make something happen" in the state. Good conference. Thanks for inviting Oklahoma.*

*Enjoyed the conference greatly. Gained much good information.*

*Conference was very rewarding. I personally received a great deal of information I can use in my own area. I would like to see a follow-up conference since this area is so new and there are still so many unanswered questions.*

*Thanks!*

*Conference provided me with a lot of helpful info. Was well-organized and enjoyable.*

*Most valuable: Sharing ideas on what has been done in all states.*

*Thanks for inviting us. We've really enjoyed it!!*

*I believe the conference was very good for most SEA people but was a bit repetitious for me personally. I also felt more interactive time in smaller discussions would have been better.*

*More information on inservice organization.*

*Excellent workshop.*

19. (con't)

*Very fine conference. Well organized, highly informative.*

*Many of the problems addressed were not problems that we face yet, e.g. buying hardware and software, unfortunately.*

*The conference has been great! I want to learn more from those people and work with them.*

*This has been a very informative workshop in a very relaxed atmosphere. I feel very honored to have been able to be part of this conference. I am looking forward to a follow-up conference coming to my state at a later date. This will enable more people from my school system to attend.*

*Well done SEDL--now if I just have time to read all the material!*

*Material presented was very good. However, I think a more diligent effort to keep speakers on schedule would facilitate absorption by listeners.*

*R&D conferences should be kept small. Don't allow an R&D Speaks to become just another speaks.*

*This conference has given me a great deal to think about and consider. Perhaps my philosophy about computers and media centers has been too narrow, too geared to my school's situation and needs to be looked at again. Thank you.*

*Keynote was weak. Others were terrific. Sandy Pratscher was outstanding. Shoud have gotten Judah Schwartz, MIT. Need something for higher level administrators in SEAs. We were preaching to the choir, although the information shared was valuable.*

*Robert Taylor was the low point of the conference and both Vickies were great!*

*This conference was well organized and implemented. The SEDL staff was extremely cordial and cooperative. It is always a pleasure for me to attend an SEDL conference.*

*I feel the conference was a success. I admired your goals, learned from the conference, and was appreciative for the opportunity to attend and speak.*

*The presentations on Tuesday were excellent for those not thoroughly familiar with computer usage and terminology.*

*Very good!*

19. (con't)

*The sessions on software evaluation and teacher training were especially helpful to me. I would like more in these areas for training and resource collection at the SEA level. Project AID may serve as the clearinghouse in Arkansas on these topics and I would like to have as much information as possible for this purpose. ERIC is a good source of this information but it is not as widely used as it could be. This was a very good conference. Thanks!*

*I have thoroughly enjoyed the conference proceedings and hope that I am kept informed of future developments in the area of microcomputers in education. Most valuable: finding out what is happening at the state level. Least valuable: I enjoyed it all! Good job, Nancy!!*

*Good program.*

*Most valuable: 1) contacts, 2) talking with software evaluators, 3) talking with vendors. I think a special period should be scheduled to see the vendors. Trying to see them during the breaks was not satisfactory for us or probably for them.*

*Thank you for the opportunity to attend. The workshop was very valuable and well planned. The presenters were professional and well informed. The materials distributed were abundant and on target. I appreciated having the various vendors on hand to demonstrate their hardware and courseware.*


SOUTHWEST EDUCATIONAL DEVELOPMENT LABORATORY
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Regional Exchange at Southwest Educational Development Labortory (SEDL/RX) is one of
ıt regional exchanges and four central support services which comprise the Research &
ɜlopment Exchange (RDx) supported by the National Institute of Education. The RDx,
ın in October 1976, has four broad goals:

- To promote coordination among dissemination and school improvement programs.
- To promote the use of R&D outcomes that support dissemination and school improvement efforts.
- To provide information, technical assistance, and/or training which support dissemination and school improvement efforts.
- To increase shared understanding and use of information about client needs to order to influence R&D outcomes.

regional exchanges in the RDx act as extended "arms" of the network, each serving a
of states which make up their region. The eight regional exchanges (known as RX's)
:

- AEL/RX — Appalachia Educational Laboratory, Charleston WV
- CEMREL/RX — CEMREL, Inc., St. Louis MO
- McREL/RX — Mid-Continent Regional Educational Laboratory, Kansas City KA
- NE/RX — Northeast Regional Exchange, Merimack Education Center, Chelmsford MA
- NWREL/RX — Northwest Regional Educational Laboratory, Portland OR
- RBS/RX — Research for Better Schools, Philadelphia PA
- SEDL/RX — Southwest Educational Development Laboratory, Austin TX
- SWRL/RX — Southwest Regional Laboratory, Los Alamitos CA

four central support services, which serve the entire RDx in their respective areas of
ɜrtise, are:

- RDIS — Research & Development Interpretation Services, CEMREL, Inc.
- RRS — Research & Referral Service, Ohio State University, Columbus OH
- SSS — System Support Service, Far West Laboratory, San Francisco CA
- DSS — Dissemination Support Service, Northwest Regional Laboratory

SEDL Regional Exchange (SEDL/RX) provides information and technical assistance
ɤices to the six states in its region. It directly serves and is guided by an Advisory
rd composed of designated SEA and ROEP VI participants. For further information
tact the Advisory Board member from your State Department of Education, the ROEP VI, or
Director of the SEDL/RX, Dr. Preston C. Kronkosky. The Advisory Board members are:

| | | |
|---|---|---|
| Arkansas | Sara Murphy | 501/370-5036 |
| Louisiana | Sue Wilson | 504/342-4268 |
| Mississippi | Jimmy Jones | 601/354-7329 |
| New Mexico | Dolores Dietz | 505/827-5441 |
| Oklahoma | Jack Craddock | 405/521-3331 |
| Texas | Marj Wightman | 512/475-5601 |
| ROEP VI | John Damron | 214/767-3651 |