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ABSTRACT
        This guide is the first in a series of documents that
constitute a handbook offering assistance to teachers and
administrators in making decisions about: (1) the potential uses of
computers in classroom settings; (2) development and management of
programs; (3) direct instructional applications and instructional
support functions; (4) staff development for teachers and
administrators in learning about the computer itself; (5) selection
of appropriate computer hardware and software; and (6) where, how,
and when to obtain additional information. This introductory booklet
includes a brief discussion of the use of computers in curriculum and
instruction and specifically in Washington state, why the handbook
was developed, the needs the handbook addresses, what the component
parts of the handbook include, how the guides are organized, plans
for handbook dissemination, and a glossary. Concluding background
information gives the focus and goals of the Computer Technology in
Curriculum and Instruction Task Force. (LMM)

Computer Technology in
Curriculum and Instruction
Handbook

Introduction

Introduction

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COMPUTER TECHNOLOGY IN CURRICULUM AND INSTRUCTION TASK FORCE

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"Computer figure" courtesy of Leo B. Christopherson, author of ANDROID NIM

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3

INTRODUCTION

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4

TABLE OF CONTENTS

THE USE OF COMPUTERS IN CURRICULUM AND INSTRUCTION

> "It is now universally accepted that every school should own at least one computer. The more adventurous schools even accept the idea that there ought to be a computer in every classroom....A more accurate formula will be one computer per child. The computer can and should be as commonplace as the pencil....The pencil is universal: everyone uses it....The pencil never dictates what 'we do with it, but enhances our ability to do anything we want it to do. So, from my vision, does the computer."[*]

Educators, parents, students and potential employers are concerned that the future of many young people will depend upon their knowledge and skills in the use of computers. Education Market Forum predicts that "By 1985, 75% of all jobs will require some knowledge of computers." The Wall Street Journal, assessing the impact of computer applications on the process of education as well as on the content of curriculum indicates that "Computer software will eventually complement 95% of all textbooks in use."[**]

Indeed the computer age is upon us and the schools will play a major role in preparing students for their futures. Many of the more affluent homes already have computer, but all children will be entering a computerized world. Unless our schools can provide equitable learning experiences and programs in computer education for all students, an increasing educational and consequential economic gap will be created between the "information rich" and the "information poor" students. It's only in the schools that all children can gain the necessary understandings and knowledges to be computer literate in a society predicated on access to and the use of information.

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[*]Papert, Seymour, "Society may balk, but the future may demand a computer for each child." Electronic Education, (September, 1981)

[**]Chambers and Bock study. The Computing Teacher, (January, 1982)

The computer, like the pencil, will do anything we want only if students and teachers

1. have a basic knowledge of how the computer works, what it can and cannot do;
2. understand the specialized terminology necessary to transmit and apply this knowledge;
3. have opportunities to interact with the computer in a classroom setting; and
4. are both knowledgeable about and comfortable with computers.

WHAT ABOUT COMPUTER EDUCATION IN WASHINGTON

Many educators in Washington State recognize the need for computer education and are rapidly making the computer a part of the regular school program. Preliminary results of a 1981 study conducted by Frank Fisher and Allan Dunn indicate that there is an average of one computer to every 302 students in the 483 responding schools (grades 4-12). However, the data reflect a major problem that has developed and that must be resolved: There are now more computers available for instruction than there are trained teachers. Although there is only one computer for every 302 students, for every 344 students only one computer-knowledgeable teacher is available. We can expect this disparity to increase rapidly unless the problem is effectively resolved.

The classroom teacher is placed in the pivotal role of determining how students can learn effectively and how the instructional process can facilitate mastery of the "mystery" of computers. The classroom teacher must feel knowledgeable and comfortable in developing and implementing instructional programs for computer literacy, applying computer skills to other curriculum areas, organizing and managing the classroom environment, and assessing students' needs and progress in the program. At this time, most teachers in our state have limited awareness of the potential role of computers in the instructional program.

- 2 -

7.

Building and district administrators must also be given similar opportunities for training if they are to make informed decisions and provide needed support regarding selection, development and implementation of instructiona' programs using the computer.

WHY THIS HANDBOOK WAS DEVELOPED

This Handbook is a planning guide for classroom teachers and administrators who are interested in the instructional uses of computers in the classroom.

It is intended to provide you assistance in making effective decisions about:

- the potential uses of computers in classroom settings
- development and management of programs
- direct instructional applications and instructional support functions
- needed staff development for teachers and administrators in learning about the computer itself
- selection of appropriate computer hardware and software
- where, how and when to obtain additional information.

WHAT NEEDS DOES THE HANDBOOK ADDRESS?

Data collected from the field about needs for information and assistance in the use of computers in education made one need clear: a simple but fairly comprehensive planning guide or handbook for classroom teachers and administrators. Task Force members, their ideas reinforced by a selected panel of expert practitioners in the field, determined that the Handbook should provide guidelines to assist teachers and administrators to answer the following questions:

- What is the purpose of buying a computer?
- How will the computer be used?
- What kinds of staff development will be needed?
- What curriculum will be taught?
- Who will be responsible for the program, the equipment, the scheduling, the repair?
- Where will the equipment be used and by whom?

- 3 -

8

- What do we need to know in order to make decisions about:
  - software?
  - hardware?
  - physical layout?
  - staff development?
  - what kinds of programs are most appropriate for us?
  - who can we contact for more information?
  - how can we use limited dollars most effectively?

AND ABOVE ALL -

How do we begin? Where do we start?

WHAT DOES THIS HANDBOOK INCLUDE?

In an attempt to assist districts in answering questions such as those above, this Handbook is published as a series of guides addressing the following topics:

- "So You Want to Use Computers"

  (To help develop goals, objectives and programs, as well as select hardware and software appropriate to the needs and program of the district.)

- Design for Staff Development

  (To assist teachers and administrators design staff development programs which will result in personnel being able to use computers in curriculum and instruction.)

- Courseware Evaluation

  (To assist in setting/developing selection criteria for software, locating reviews, developing evaluation procedures for software and integrating computer curriculum into the overall district program.)

- 4 -

9

- **Resources**

    (To provide selected information and bibliographies which may be helpful in providing background for decision-making at the local level, including K-12 curriculum models.)

- **Practitioners' Directory**

    (To help identify resource people in the field who are already working with computers in the instructional process.)

HOW WILL THESE GUIDES BE ORGANIZED AND KEPT CURRENT?

Each of the guides will be a self-contained publication focusing on a single major area; all together, the six booklets will comprise a comprehensive, concise handbook. Each booklet will be published in a three-hole format so that all booklets may be filed together for handy reference.

Because the world of microcomputers is such a rapidly changing area, a schedule for updating several of the booklets is anticipated.

HOW WILL THE HANDBOOK INFORMATION BE DISTRIBUTED/DISSEMINATED?

This introductory booklet, "So You Want To Use Computers", "Resources" and "Practitioners' Directory" will be introduced during a series of orientation sessions in the fall and winter of 1982. These sessions will be conducted in each ESD. Additional orientation sessions may be conducted statewide using WETNET facilities. Schedules will be announced through your local ESD and also publicized in <u>Your Public Schools</u>.

- 5 -

GLOSSARY

BASIC

An acronym for "Beginner's All Purpose Symbolic Instruction Code." A high level conversational, interpretative programming language in wide use. It permits the use of simple English words and common mathematical symbols to perform the necessary arithmetical and logical operations needed in programming microcomputers.

BIT

The smallest unit of information that the computer recognizes, a bit is represented by the presence or absence of an electronic pulse, 0 or 1.

BYTE

A byte is to a bit what a word is to a letter. Usually, one byte is eight bits long.

CHIP

A thin silicon wafer on which electronic components are deposited in the form of integrated circuits. Technologically, the key to the microelectronic revolution in computers.

CAI (COMPUTER ASSISTED INSTRUCTION)

Direct instruction conducted by the computer. Examples of this type of instruction are: drill and practice, tutorial, simulation and gaming, inquiry and dialogue, information retrieval and problem solving.

11

CMI (COMPUTER MANAGED INSTRUCTION)

Instructional support functions conducted by the computer. Examples of the support functions are: testing, prescribing, record keeping, schedule monitoring, and time and resource management.

COMPUTER LANGUAGE

A language used to communicate with a computer. All computer language instructions must be translated by a program within the computer into the machine's internal language in order for the instructions to be implemented.

COMPUTER LITERACY

An understanding of computers and their application in the everyday world.

Area of knowledge that includes:

1. an understanding of the technology used when processing information;

2. an understanding of the effects that computers have had and will have on society; and

3. an understanding of how computers are problem-solving tools.

COURSEWARE

A combination of content, instructional design, and the computer instructions (software) which causes a computer to execute a program.

CPU (CENTRAL PROCESSING UNIT)

Controls what the computer does. In the arithmetic control, the logic units computations and function directions are done for the computer. The CPU can be considered the center core of the computer.

CRT (CATHODE RAY TUBE)

Similar in appearance to a television screen; most microcomputers use a CRT as their output device. It is usually accompanied by a keyboard as an input device.

DISK (DISC)

A record-like magnetic-coded piece of material, 5" or 8", that can store programs, data or tables of information. The process is similar to storing music on a magnetic tape. The information is stored randomly and therefore faster than cassette storage.. Sometimes called diskettes or floppy disks.

DISK DRIVE

A mechanical unit that may be built into the microcomputer case or an add-on peripheral which reads and records on a round magnetic surface.

DISKETTE (FLOPPY) DISK

A smaller version of a disk (often the size of a 45-rpm record); a convenient and comparatively inexpensive way to store data on a microcomputer.

DOCUMENTATION

The instructional guide that describes a program and how to use it.

GIGO

"Garbage in, garbage out." If incorrect information is put into the computer, the output will be misinformation.

HARDCOPY

Data or information printed on paper as distinguished from a temporary image on the computer's screen.

HARDWARE

The physical equipment that goes into a computer system, consisting of the central processing unit plus all peripherals.

INPUT

Information going to and from a computer or peripheral. The same data may be output as well as input depending upon what part of the computer to which it is going or coming.

INSTRUCTION

A group of bits, commands, that will make the computer perform a specific operation.

I/O

Input and output of data and information of a computer system; examples are: keyboarding, floppy disk drive, printer, cassette recorder, modems, graphics tablets.

K (KILO)

Equals 1000--With the microcomputer it is speaking of the RAM or ROM memory capability, i.e., 16K is 16,000 bytes of information.

KEYBOARD

Similar to a typewriter keyboard, this is where information is put into the computer. Computer function keys are here such as reset, rerun, clear, etc.

MEMORY

The section of the computer where instructions and data are stored.

MEMORY CAPACITY

The maximum number of storage positions in a computer's memory. Typically, a microcomputer can have up to 64K bytes of memory.

MICROCOMPUTER

Usually included in a microcomputer is the microprocessing unit, key--board for entering data, and a cassette recorder or disk for storing programs, and a monitor. A hardware configuration usually acquired in one of three ways: constructing several already-constructed components; or by purchasing a unit with built-in components. The microcomptuer records information, processes it, puts it into meaning-ful terms, communicates it, stores it and retrieves it.

MODEM

A telephone hookup device that converts computer signals so that they can be sent over telephone lines; this allows microcomputers to communicate with larger systems, such as timesharing networks. The modem changes the tones to signals understood by the computer.

NETWORK

An interconnected group of computers or terminals linked together for specific communications.

OUTPUT

Information coming from the microcomputer to a display unit, i.e., video display unit, printer.

PERIPHERAL

A device--for example, a video display screen or a printer--used for storing data, or for entering it into or retrieving it from the computer system.

PROGRAM

A set of coded instructions directing a computer to perform a particular function.

SOFTWARE

A general term for computer programs. The instructions to tell physical equipment (hardware) what to do. Software is stored on tape cassettes, disks, and solid state cartridges. The microcomputer loads the software into its memory to utilize the software programs.

STORAGE CAPACITY

The quantity of bytes a storage unit can hold. A diskette is said to have 48K (48,000 bytes), approximately 48,000 characters, letters, numbers, spaces, or symbols available.

TERMINAL

A peripheral device which allows human communications with a computer. When it is called a terminal, it is frequently tied to a mainframe computer.

BACKGROUND INFORMATION

A SURVEY TO IDENTIFY FIELD NEEDS

In the fall of 1981, the Division of Instructional and Professional Services at SPI initiated a new plan for emphasizing program development in field-identified, high-priority areas.

These priority areas were selected from a Delphi Process Survey conducted during 1980-81, which involved over 1,000 participants state wide. A random sample of teachers, as well as district superintendents, curriculum directors, principals, representatives of educational organizations, institutions of higher education, private schools and ESD and SPI staff members responded to this survey. The survey itself was composed of questions generated during a series of meetings in each Educational Service District and results of the first round survey questions were returned to respondents for consensus.

High field-interest areas emerged clearly and formed the basis for specific areas of emphasis for the Division of Instructional and Professional Services' staff during the next few years.

RESULTS OF THE SURVEY DETERMINE FOCUS OF EFFORTS

Three priority areas were selected for initial emphasis in 1981-82:

- Student Discipline and Motivation
- Oral and Written Communications
- Computer Technology in Curriculum and Instruction

Existing staff of the Division were formed into three separate Task Forces to focus on the three priority areas. This publication introduces you to a series of services and products which are a result of the work of the Computer Technology in Curriculum and Instruction Task Force.

The general overall <u>focus</u> of the Computer Technology in Curriculum and Instruction Task Force is to address classroom use of computer technology in curriculum and instruction for educators and students.

This focus includes:

I. Learning about the computer

   A. computer literacy
   B. computer programming
   C. problem solving

II. Application in the classroom

   A. instruction including but not limited to:

      1. drill and practice
      2. tutorial
      3. simulations
      4. educational games
      5. testing
      6. problem solving

   B. instructional support including but not limited to:

      1. computer managed instruction
      2. objective management (e.g. SLOs)
      3. diagnostic testing.
      4. record-keeping including mastery learning
      5. cross-referencing instructional materials
      6. lesson plans
      7. grade recording

The <u>goal</u> of the Computer Technology Task Force is to increase the awareness of the potential uses of computers in classrooms and to address staff development needed to establish computer usage skills.

SPI

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