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ABSTRACT

This module of a competency-based staff development training package is concerned with computer assisted reporting in a guidance, counseling, and placement program. The first goal of this module is to provide the participant with general knowledge of the process necessary to develop an effective computer information system. The second goal is to be able to select the best approach for gathering and analyzing data from all available options. The module's objectives call for developing the ability to work with a systems analyst in designing a system that meets the needs of one's district or department and in training staff personnel to interpret the reports produced. (SJL)

a Systematic Approach to Guidance

Computer Assisted Reporting

2

AN ESEA TITLE III PROJECT

A COMPETENCY-BASED STAFF DEVELOPMENT TRAINING PACKAGE

MESA PUBLIC SCHOOLS »» DR. GEORGE N. SMITH, SUPERINTENDENT

CREDITS

Computer Assisted Reporting

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with Duane Richins

Mesa Public Schools in cooperation with
The American Institutes for Research

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FOREWORD

This module was developed as one of eight dissemination packages which were being prepared under an E.S.E.A. Title III project. The Mesa Public Schools worked in concert with the American Institutes for Research (AIR) in this Title III project.

It should be noted that what is being presented here is information on Mesa's on-going long-range project in career guidance, counseling, placement and follow-up; funded not only by Title III but also by Vocational Education Part D Exemplary and District funds. A key element of this project has been the designing, field testing and final production of staff development training packages.

The specific participation of E.S.E.A. Title III comprises an integral part of the total process for orienting counseling services toward specific student outcomes in an accountability model. Title III is housed in the Arizona Department of Education under Carolyn Warner, Superintendent of Public Instruction. The Title III staff was directed by Fred J. Sughrue and the consultants assigned to this project were Jewell Sisemore, the Assistant Director of Title III, and Jesse Udall, Education Program Specialist.

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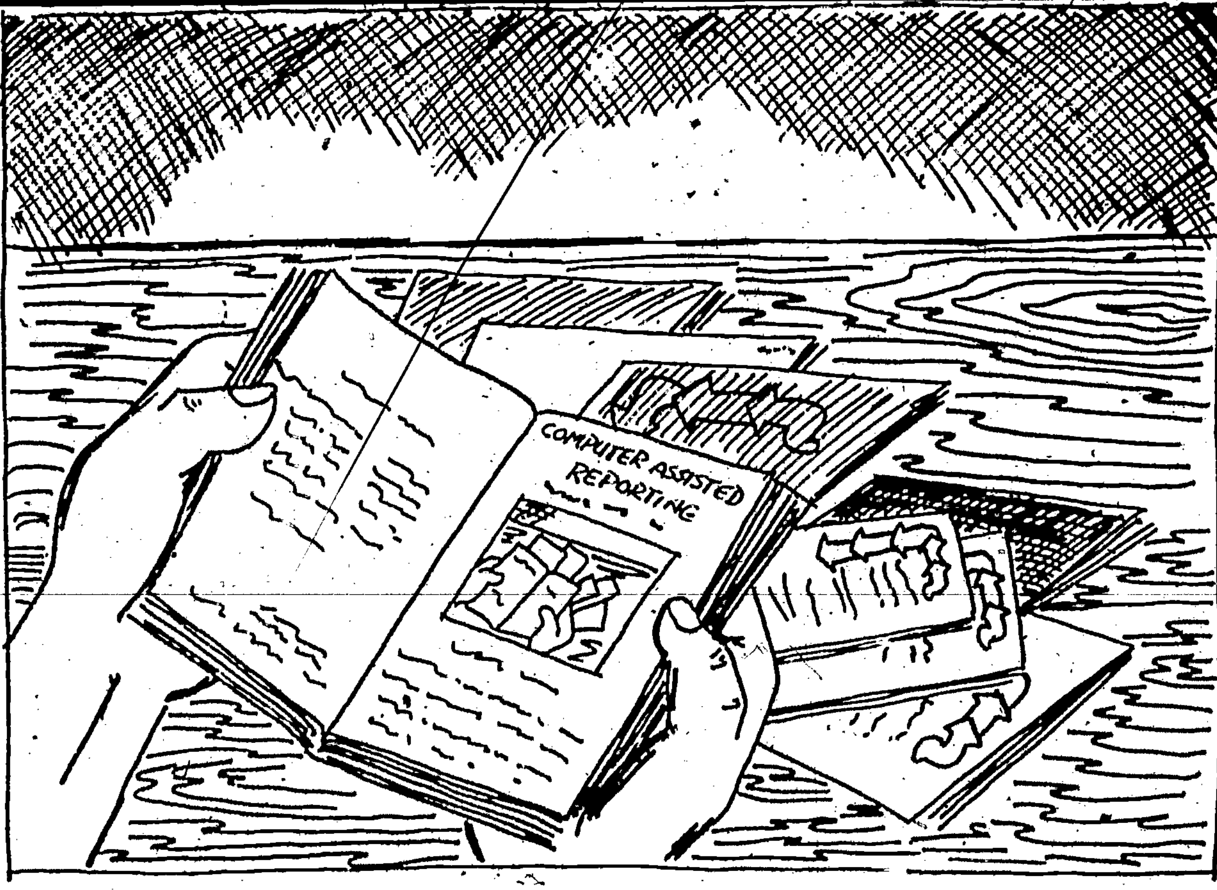


INTRODUCTION

OVERVIEW

This "module" is part of a package which includes the following:

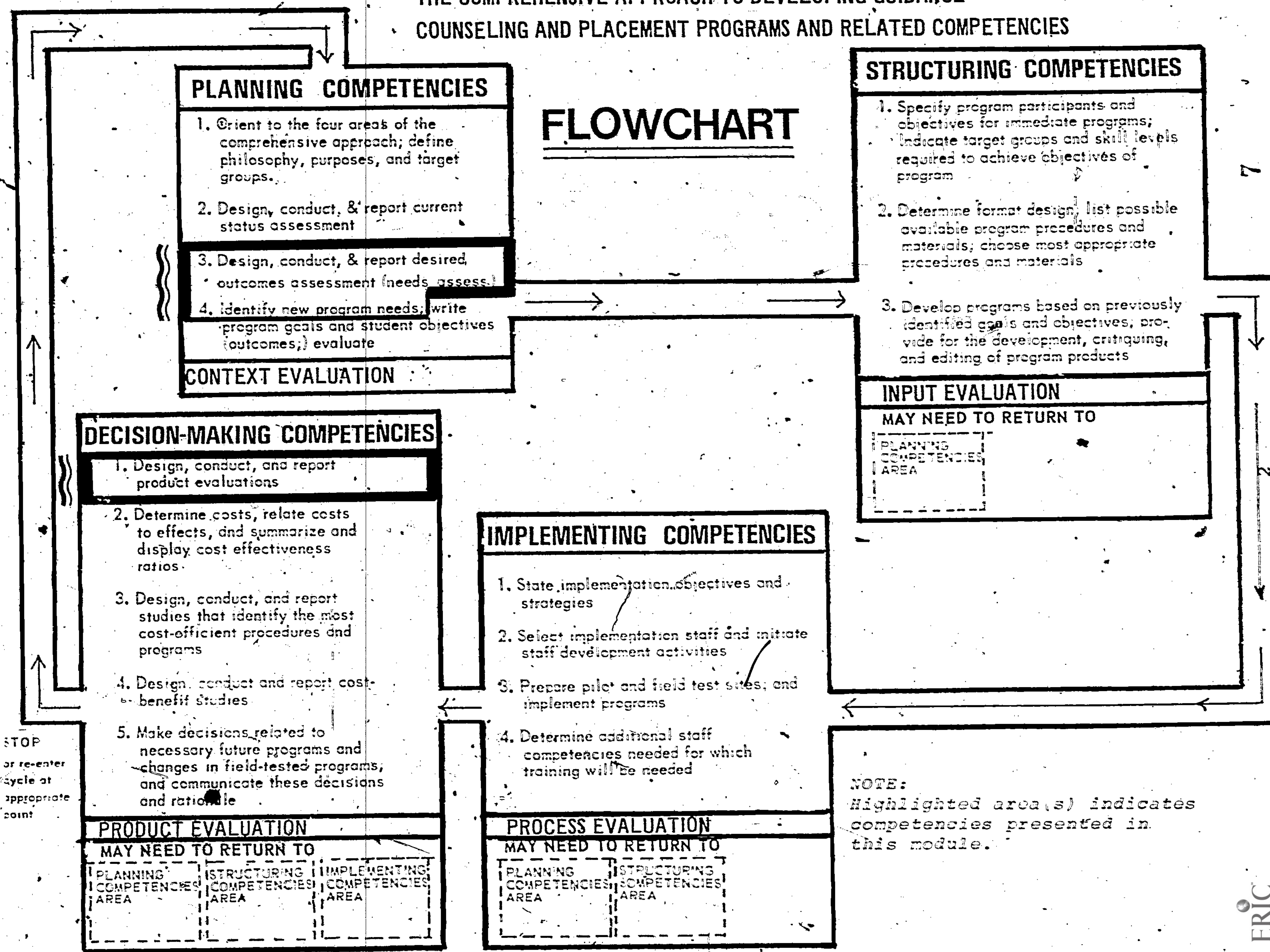
- Coordinator's Guide - Appendix A
- Tape-slide introduction - Appendix B
- Flowchart of the comprehensive approach
- Module goal and objectives
- Instructional materials (module)
- Group activities
- Simulation
- Application procedures
- Pre- and Post-assessments

Packages are designed so that you may work at your own pace but should not take over 20 hours to complete.

The module itself contains the flowchart to the comprehensive approach, the package goal and objectives, instructional materials, and group activities. The flowchart defines the four major phases of the comprehensive approach to developing guidance, counseling, and placement programs and how they relate to each other.

THE COMPREHENSIVE APPROACH TO DEVELOPING GUIDANCE COUNSELING AND PLACEMENT PROGRAMS AND RELATED COMPETENCIES

FLOWCHART



NOTE:
Highlighted area(s) indicates competencies presented in this module.

The preceding diagram illustrates the parts of the comprehensive approach you will be learning about in these staff development packages. Each of the packages helps the reader to develop one or more of the competencies listed. The general purpose of this module and the specific outcomes that you should achieve through it are summarized below through the goal statement and package objectives.

MODULE GOAL

When you have completed the readings and activities of this module, you will (1) have a general knowledge of the process necessary to develop an effective Computer Information System and (2) be able to select the best approach for gathering and analyzing data from all available options, for your district's particular needs.

MODULE OBJECTIVES

When you have completed this module, you will be able to:

Page		
40	1.	Develop and communicate the steps necessary to complete an effective Computer Information System.
42	2.	Perform a preliminary evaluation of alternative approaches to solving your needs.
33 & 51	3.	Work with a systems analyst in designing a system that meets the needs of your district or department.

65 – 68 4. Understand the process that occurs during the Programming and Test Phase at your data processing installation.

5. Work with a systems analyst in

61 – 62 (a) Training staff personnel to interpret the reports produced.

42 – 71 (b) Developing and maintaining documentation that staff personnel will understand and use in the gathering of data and the interpreting of reports.

67 6. Identify the significant factor necessary in developing input data for the system's test purposes.

MODULE OUTLINE

Approximate Time	
1.5 hours	Introduction. You take the pre-assessment and view a tape-slide presentation. Next, you engage in a brief activity. Then the coordinator will explain the structure and purposes of the module.
3 hours	Initial Reading. Read the text, which provides history and background in computers. Tour of computer facility concludes this section.
2 hours	In-Depth Study. You extend your knowledge of design and implementation of computer information system.
30 minutes	Simulation. This activity gives you a chance to practice skills you have learned in readings.
1 hour	Application. In this activity you begin planning to use your systems design skills.
1 hour	Post-Assessment. Here is where you demonstrate that you have achieved the objectives of the module.

PRE-ASSESSMENT

1. What are the six major steps in developing an effective Computer Information System? (p. 40)

A. ______________________ D. ______________________

B. ______________________ E. ______________________

C. ______________________ F. ______________________

2. In evaluating alternative approaches, what are three ways that a department can handle various information processing tasks? (p. 42)

A. ____

B. ____

C. ____

3. A. What is the title of the person who assists individuals in the development of computer application to solve educational problems? (pp. 33 & 51)

____

B. State three important items to stress when designing a Data Processing system. (pp. 50-65)

(1) ______________________

(2) ______________________

(3) ______________________

4. A. What is a major concern you should have during the programming phase of the development of a Computer Information System? (pp. 65-68)

____

B. Name three objectives that should be achieved to successfully complete the systems test phase. (pp. 67 & 68)

(1) ______________________

(2) ______________________

(3) ______________________

5. No item, objective is related directly to the completion of the module. (pp. 42-71)

6. What is the significance of having individuals other than the programmer develop test data? (p. 67)

____

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B. State three important items to stress when designing a Data Processing system. (pp. 50-65)

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6. What is the significance of having individuals other than the programmer develop test data? (p. 67)

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PRE-ASSESSMENT

ANSWER KEY

1. A. Preliminary Evaluation
   B. System Design
   C. Programming
   D. Systems Test
   E. Acceptance
   F. Installation

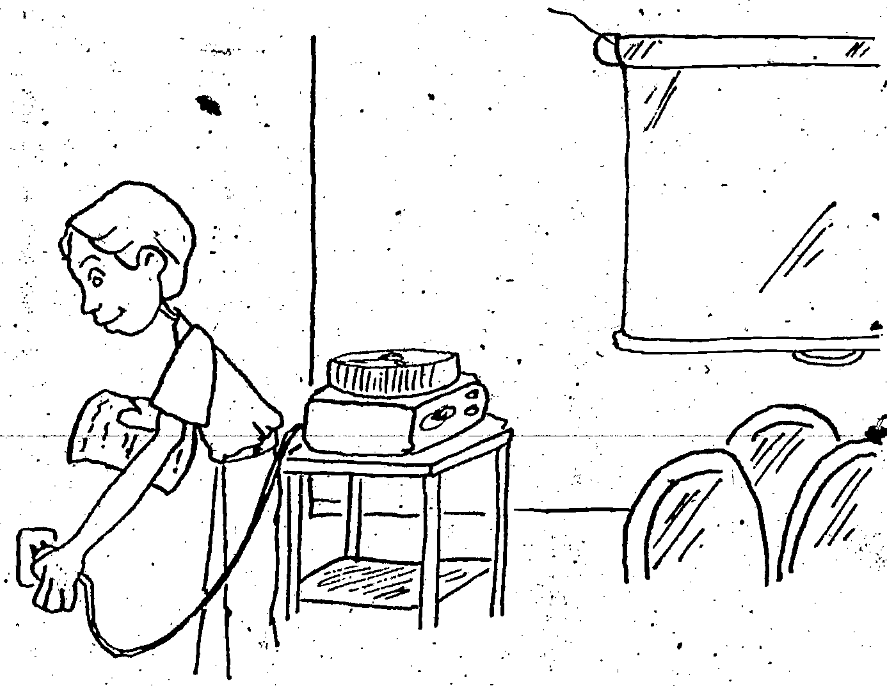
2. A. Handle entirely by your own staff (by hand)
   B. Ask Data Processing staff to help design a system
   C. Look to an outside vendor

3. A. Systems Analyst
   B. (1) Transportable language
      (2) Documentation
      (3) KISS--Keep It Simple, Stupid
      (4) Provide for future growth, etc.

4. A. Communications with the analyst
   B. (1) Review test specifications
      (2) Review timelines
      (3) Train task force
      (4) Set up procedures for change

5. No item

6. Incorrect assumptions of the programmer will surface more quickly.

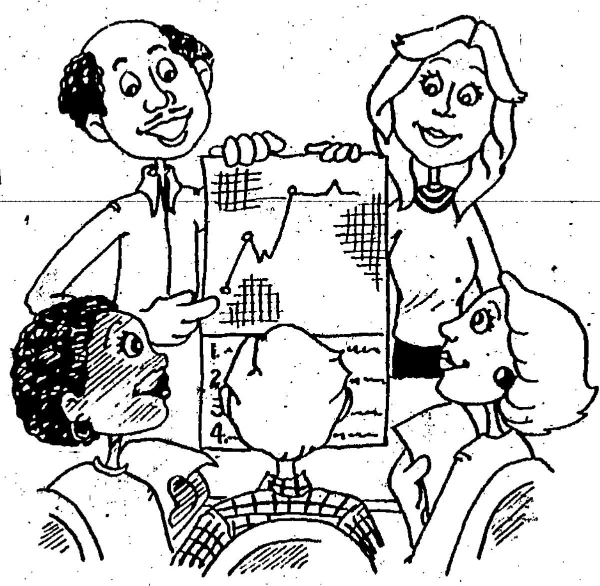


AUDIO VISUAL INTRODUCTION

This package or module, "Computer Assisted Reporting" includes an audio cassette and slides to introduce you to this phase of the staff development series. We suggest that you and any other individuals who are considering working on this package first take a few minutes to view and hear this presentation. The tape is playable on any cassette recorder. The slides are also standard and numbered in the order of appearance. An audio cue ("beep") indicates the points at which you are to advance to the next slide. Begin with the title slide in the projector gate.

In the event the tape-slide is not available, you may read through the tape-slide script which is located in Appendix B. This will give you a quick overview of the contents of the module.

INITIAL ACTIVITY



With the rapid growth of the computer industry, computers now touch our lives in many ways. Businesses such as banks, department stores, manufacturing plants and governmental units such as cities, counties, schools, state and federal agencies all use computers for various tasks. Our tax bills, utility bills, payroll checks and report cards are, in many cases, printed on computers. The illustrations of how they affect our lives are endless. However, experts say that the major growth in the computer industry is still ahead of us. Considering this, it becomes important that we have some idea of what a computer is and what it can do for us.

DISCUSSION

For the next 15 minutes the coordinator will discuss with you some of the ways you see the computer affecting your life. Some of the possible questions you might like to explore with your coordinator follow:

What are your feelings about computers?

How do they affect <u>your</u> life?

What do you feel the computer could or should do for you?

During your discussions you might look at these questions three different ways:

1. Personally
2. Occupationally
3. Educationally

INITIAL READING-TEXT

COMPUTER ASSISTED REPORTING

Historical Background and Development of the Computer

"In the beginning," as the saying goes, there was the abacus which came into use 5,000 years ago and is still the most widely used calculator on earth. Man first counted on his fingers, then toes. As his problems grew in size, he used pebbles and sticks, then finally beads for counting.

450 B.C.

The abacus (from "abax," an ancient Greek word for "slab" or "dust") was a direct result of man's early efforts to count. And, the word, "calculation" comes from the earliest form of an abacus which consisted of lines drawn on the ground, with small pebbles to represent numbers.

definition of abacus calculator

Soon, the abacus, known as our first true computer, consisted of several strings of beads on wires strung to a rectangular frame. Each bead represented a digit and the operator calculated by moving the beads on wires. Even today, a skillful operator can do arithmetic with amazing speed using the abacus. The abacus does, however, have one serious flaw--it cannot carry tens from one line to another.

working of the abacus

Since man has been ingenious from his early beginnings, he straightway began to dream of mechanical servants to do his bidding. In the Iliad, Homer had Hephaetus, the God of Natural Fire and Metal Working, construct twenty three-wheeled chariots which were propelled across the heavens to bring man messages and instructions from the Council of Gods. These early automations had wheels of pure gold and handles of the most "curious cunning."

man dreams of mechanical services

However, in an age of magic and fear of the supernatural, man's dreams were fraught with such machines that turned into evil monsters. The Hebrew "golem" was made in the shape of man, but without a soul and often got out of hand. Literature has perpetuated the idea of machines running amok, much as the room in, "The Sorcerer's Apprentice." But there have been b nevolent machines, too, such as Tik-Top, a latter day wind up man in The Road to Oz. Tik-Top could talk and do numerous oth r things men can do but had the saving grace of always doin only what he was "wound up to do."

man fears machines

lmost a hundred years ago, Samuel Butler in his satirical, E ewhon, described machines of a mysterious land. He envisioned the machines developing speech as intricate as man's and described the differences between man and his creation, the machine:

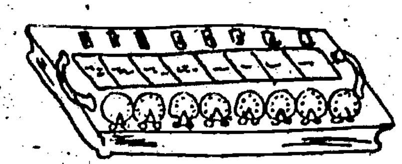
> "...our sum-engines never drop a figure, nor our looms a stitch; the machine is brick and active, when the man is weary, it is clear-headed and collected, when the man is stupid and dull, it needs no slumber... May not man himself become a sort of parasite upon the machines? An affectionate machine-tickling aphid?"

More recently in Arthur C. Clarke's 2001, A Space Odyssey, Hal, the computer directing an interstellar flight, runs amok, and murders crew members by dysfunctioning. Hal has to be dismanteled by the hero to be stopped, just as the Erewhonions had in self defense destroyed all mechanical inventions in their preceding 270 years.

Pascal's Adding Machine

Meanwhile, though man's literary imagination soared, his practical inventions of calculation machines did not keep stride. It wasn't until the 17th century that the next clearcut mechanical advance appeared. A French boy of nineteen, Blaise Pascal, tired of totaling long columns of tax figures in his father's office, invented a gear driven machine the size of a shoe box. It worked much the same as today's desk adding machines. The digits from 0 to 9 were engraved on wheels. The machine could add, subtract and had automatic tens-carrying capability. The numerical results appeared in small windows.

1642 France Pascal



Leibnitz's More Advanced Calculator

Refinements on Pascal's adding machine were made by Gottfried Wilhelm von Leibnitz. His more advanced calculating machine could multiple and divide as well as add and subtract.

1671 Germany Leibnitz

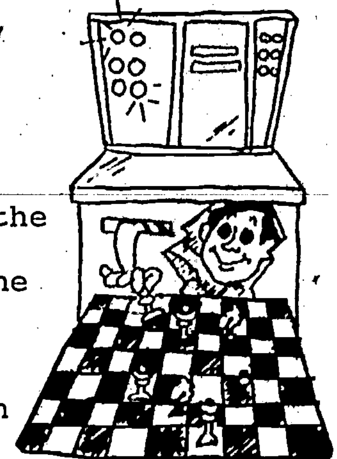
Jacquard's Punched Card Loom

Oddly enough, the next important development in calculating machines had nothing to do with calculators. A Frenchman, Joseph Marie Jacquard, developed an automatic weaving loom, which operated from instructions punched into cards. The needles were guided at each pass of the shuttle by allowing only the ones he wanted to go through holes in the cards. To change the pattern, Jacquard needed only to change a card, and cards were cheap. To advertise the scope of his new looming techniques, his own portrait of silk was

1801 France Jacquard

woven. It took 20,000 cards but was a beautiful testimonial. The principle of punched cards is the basis of many modern-day computers.

Kempeler's Chess Machine



About this time, a Hungarian, Wolfgang von Kempeler, added a bit of zest to the computer scene. Kempeler decided that machines could play games as well as work in factories so he designed a chess-playing machine called the Maelzel Chess Automateon with which he toured Europe. The chess-machine played a great game but unfortunately it didn't play fairly. Hidden inside the Maelzel Automateon was a human player. When that disillusioning fact became known, others were spurred to invent a machine that would actually play the royal game but computer chess has never been so successful since the Maelzel demise.

Babbage's Analytic Engine

The Jacquard punched card loom leads directly into an unusual and dramatic story in calculator history. Charles Babbage, angry at mathematical errors in the Astronomical Society Tables, announced he would build a machine that would make no errors. He had in mind a "difference engine" based on the difference tables of the squares of numbers. The first of the giant computers, it was to have hundreds of gears, shafts, ratchets and counters. The government promised to underwrite the project.

1822
England
Babbage

For four years Babbage and his assistants worked on the machine which became larger and more complicated annually.

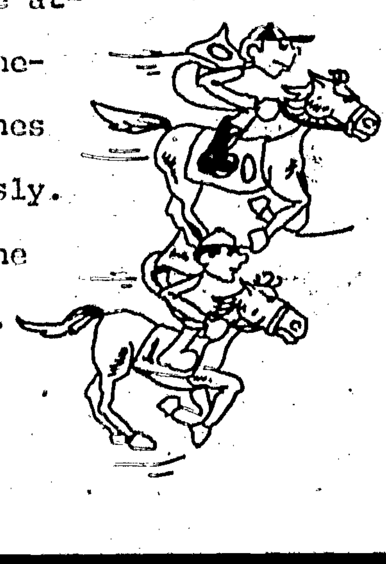
The machine soon weighed two tons and because needed parts were beyond the accomplishments of the metal working industry, Babbage designed them himself! His own thinking, like the "difference engine," became grandiose and he scrapped it in 1833 to develop an "analytic engine." His newly projected machine would do advanced calculations and print out results. There was to be a "memory" made up of the same sort of punched cards used in Jacquard's loom. Cards would also be used for input to the machine as well as control of successive operations. There was to be an arithmetic unit in which to store data, exercise judgment in selection of the proper numbers and print out the results on special copper plates. It would have been slower than a modern-day computer handling only 60 calculations a minute and was mechanical rather than electric.

A romantic phase of the Babbage story includes the daughter of Lord Byron, the poet. Lady Lovelace was a genius in mathematics, just as her father was in poetry. She devised, among other things, a form of binary arithmetic, as well as an "infallible" system for predicting horse racing winners.

Binary horse racing system

Undoubtedly Charles Babbage and Lady Lovelace were attracted to one another by their mutual interest in mathematics. She worked out complicated programs and sketches for the papers and published notes on Babbage anonymously.

But Lady Lovelace's binary system has withstood the test of time and is still used in electronic computers.



However, her betting system did not gain as much fame since it cleaned out the family fortune.

Babbage's dream for his "analytic engine" was indeed wonderful and it might have become a reality but for Charles Babbage being 130 years ahead of his time. Machine technology was not advanced enough for his ideas. Babbage kept running into financial difficulties and died a failure, but the modern computer is his dream come true. He single-handedly gave the computer art the idea of programming, sequential control, a memory unit and even modern automatic readout.

Babbage, Lady Lovelace, Jacquard, Pascal and countless others all set the stage for the introduction of data processing techniques. But the man who crystalized this background into practical devices that are used throughout the world was Dr. Herman Hollerith.

Hollerith's Punched Card Machine

Dr. Hollerith developed a punch card and card machine which used electricity and thus was the first electric computer. The dimensions and shape of the card approximated the old dollar bill for ease and handling. Unlike his predecessors, Dr. Hollerith was right in step with the times. *1889 United States Hollerith* His system was used in the 1890 census which covered 62 million people in one-third the time required for the 1880 census. Data was placed on the card in the form of punched holes. The cards were one by one, positioned over cups of mercury. At the touch of a lever, rows of telescoping pins descended. Where there was a hole the pin dropped into the mercury, and made an electric circuit, causing a pointer to move one position on a dial. The job of counting was now mechanized.

The Age of the Computer

Dr. Hollerith formed a company which merged with two other firms to become International Business Machines Corporation (IBM) and soon had four different machines in operation. As all of this was happening, the United States embarked on an amazing technological era. In the first third of the 20th century, some 1,330,000 patents were produced.

Electronic Numerical Integrator and Calculator

Scientific demands of World War II proved to be a tremendous stimulus to the development of computers and the first authentic electronic digital computer was created. A machine using electronic tubes rather than electrical relays, the Electronic Numerical Integrator and Calculator was made in 1946. Called ENIAC, it was a monstrous affair containing 18,800 vacuum tubes. Its inventors, Drs. J. Eckert and John W. Mauchly, spent two and one-half years just soldering the 500,000 connections. ENIAC weighed 30 tons and filled over 1,000 square feet of space but it could perform 4,500 additions in a single second.

1946 United States ENIAC

But ENIAC lacked one important element--it did not have a true stored program memory. Instructions for the machine were recorded by removable plugwires. As a result, once data was put in the computer, it had to progress according to these pre-set devices.

Selective Sequence Electronic Calculator

1948 S.S.E.C.

By 1948 IBM introduced the S.S.E.C. (Selective Sequence Electronic Calculator). It was smaller than ENIAC but was the first electronic machine to employ a stored program, and could modify its own instructions as it processed.

von Neumann's EDVAC

1949 England EDVAC

In 1949 Dr. J. von Neumann of Cambridge designed EDVAC, the first internally stored computer. EDVAC pioneered the use of the binary number system and achieved its storage capability with ultrasonic mercury devices. By 1950 EDVAC was put to use in the United States.

Las Alamos' Problem Hippo

Also in 1950 the Las Alamos Atomic Energy Laboratory presented the S.S.E.C. with "Problem Hippo," a massive mathematical operation calling for nine million arithmetic solutions. The computer completed in 150 hours what would have taken a mathematician 1500 years to do.

By 1950 five different firms had begun to manufacture computers. Soon the increasing spread of computers led to a highly significant development--time sharing. The time sharing system is so fast that it can be programmed to move in millionths or billionths of a second from one task to another. Operators at different locations can use the system simultaneously to perform different computations, each receiving a response within a few seconds.

There are numerous computers today each used for different purposes. Some of the computers are:

- The IBM 709 computer at Cape Kennedy, Florida. Working on experiments with satellites the 709 may solve as many as 5 million problems a day as part of the National Aeronautics and Space Administration Program.

- ERMA, a banking expert (Electronic Recording Machine). ERMA works at the Bank of American in San Jose, California. She does the bookkeeping for four branches.

- AUDREY is being developed by the Bell Telephone Laboratory to understand the human voice. Engineers hope that hearing a voice speak audibly will be able to make long distance connections automatically.

- SAGE and TALOS guard the U. S. against attack. Sage can spot any plane or missile that approaches. The object appears on a television screen. The Talos Computer System automatically sends up missiles to interfere with enemy craft.

Other computers aid in making airline reservations, run factories automatically, and predict election results. Computers are also used for teaching and translating foreign languages to English. They run railroads, park cars, translate books for the blind and "write" music. This broad application of computer power has been called "The Second Industrial Revolution." What the steam engine did for muscles, the modern computer is beginning to do for our brains.

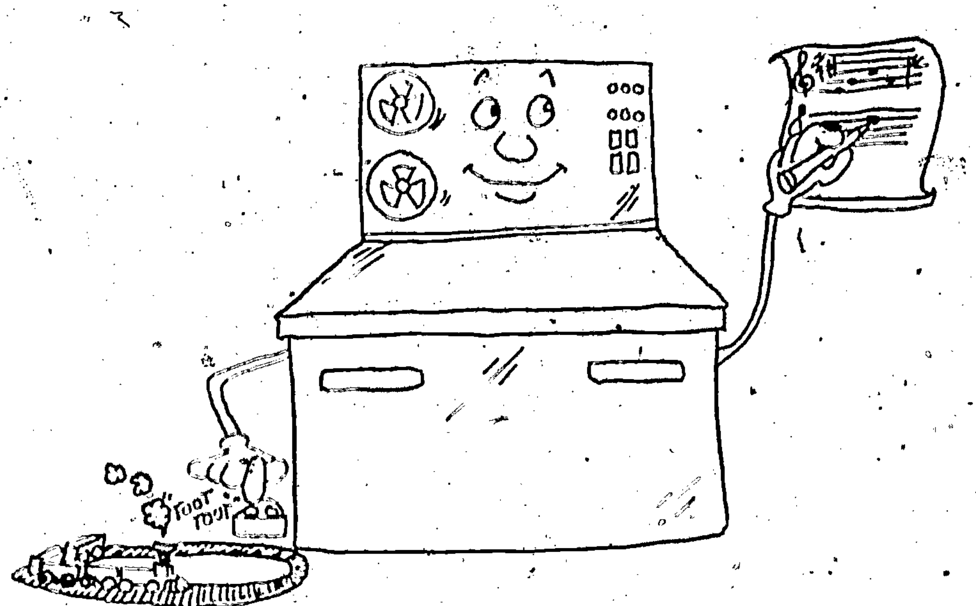
IBM 709

ERMA

AUDREY

SAGE and TALOS

Because the computer age has just begun, it is hard to imagine what computers will be able to do next. That word "imagine" is important for whatever scientific progress has been made in computer systems has been made because MEN have been able to imagine. That is something a computer cannot do. Only men think--computers do. It is comforting to know that man will always tell the computer what to do. Despite earlier fears men displayed about mechanical thinking machines, no computer will ever run the world anymore than the cotton gin, steam engine or television have. And, in an emergency, we can always pull the wall plug!



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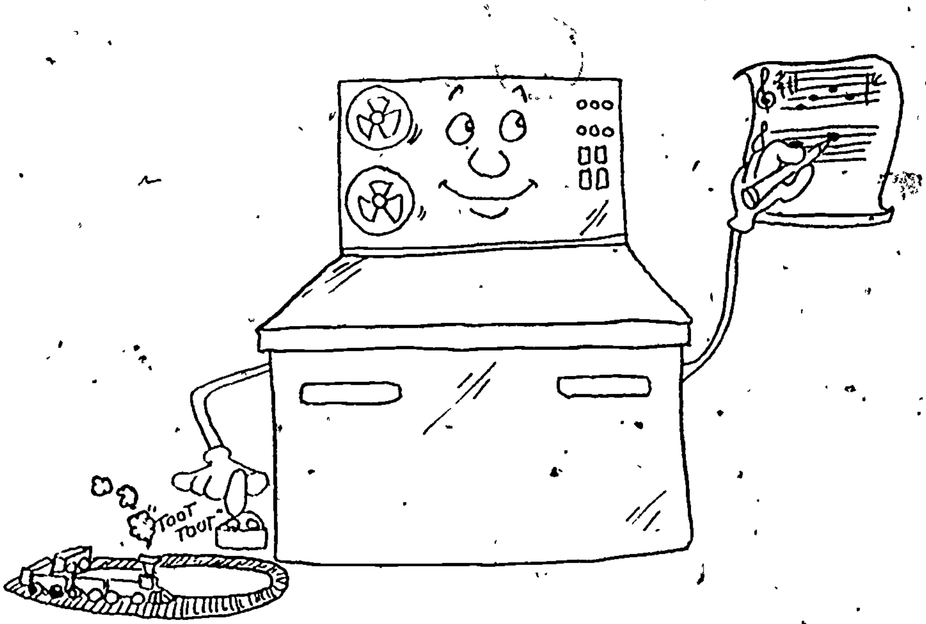


THE HOW? WHY? AND WHAT? OF COMPUTERS

Most of us think of electronic computers as mysterious "thinking wizards" which can somehow solve problems that baffle the best human minds; we anxiously wonder if "the machine will replace man." But computers are not electric wizards. Instead, a computer is an inanimate collection of tubes, wires, and metal boxes. It solves very difficult problems in a simple way. All that it can really do is answer "yes" or "no" and each astonishing task it completes is a result of a series of these simple answers.

What is a computer?

Computer is a Latin word that means "to count." So the computer is a special kind of counting machine that can do arithmetic at incredible speeds. Its primary advantage is speed. Computations which manually require days and weeks can be completed in seconds.

We have at our command a tool of a magnitude never known before and though it is absolutely first rate, a computer can only do what some human being has instructed it to do. A computer can't think or feel. It has no creativity or sensitivity, no values, principles or ethical standards. A computer will never have inspiration, "fire," "soul," "spirit" or "life." Neither it nor any of its descendants will ever replace the uniqueness of the human mind.

Human brain versus computer

For one thing, the human brain can store about 2 1/2 million times more information than today's most advanced computer. The human brain can hold some 10 million-million "bits" of information--enough to cram the shelves of a library--all tucked away in a large 100 cc case, that weighs about 3 pounds. A giant computer--a 1 to 4 million bit machine--requires 60-70 cubic feet, and holds around 200 pounds of memory units.

How Does a Computer Work?

When a computer rolls off the manufacturer's production line it is virtually useless. It cannot perform even the simplest actions without precise instructions from man. How do we get a simple machine to carry out a complicated job? We do it by making the complicated job simple. We break the job down into a sequence of small steps. When instructions are linked together which direct the computer in these steps, they form a program.*

THE WORKING ELEMENTS OF A COMPUTER

Hardware

The mechanical, magnetic and electronic devices of a computer are called hardware. In the section following which explains how a computer works, hardware as well as peripheral equipment will be discussed. Peripheral equipment is used to either store the data or program, input

Hardware

*Most new words that appear in this module are defined in the Glossary of Terms (page 77).

the data or output the data or program. Some examples of peripheral equipment include disk and drum storage, tape printers and terminal equipment.

All electronic computers have the same five basic components as illustrated in the diagram below:

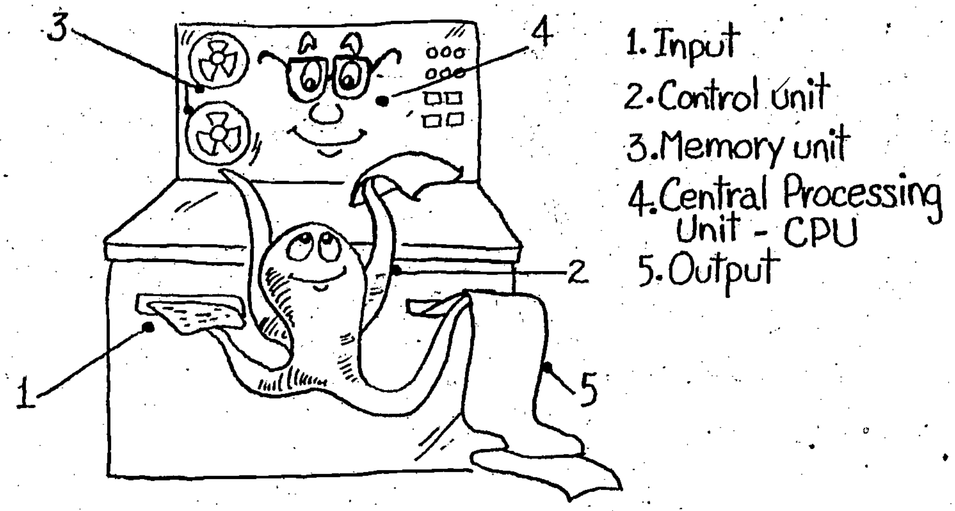
(1) An input device

(2) A control unit

(3) A storage or memory unit

(4) The central processing unit--CPU

(5) And some device for emitting results or output unit.



Input

The input unit is used to enter the set of instructions or program and data to be used by the computer. Three different ways to put in a set of instructions are:

(1) An electric typewriter may be wired to the computer;

(2) A punched card reader that transfers information from the cards to the computer's memory; or

(3) A high speed magnetic tape device.

Input

A comparison of magnetic tape and the punched cards indicate the tapes advantages. A punched card measures 7" x 3" and may contain up to 80 characters of data. High speed card readers can read some 65,000 characters a minute from punched cards. The magnetic tape device is faster than the punched card reader and the tape is a more compact storage medium than the cards. One inch of magnetic tape may contain over 1,000 characters and the tape reader may read more than 100,000 characters per second. Once a set of instructions has been entered, the computer will perform these instructions the same way every time. If the instructions are incorrect, the results will be incorrect.

Because of the speed of the computer, mathematical calculations can be carried out to more decimal places than would be practical to do by hand. This gives the scientist or engineer more accurate calculations for design and measurements.

Control Unit

Control Unit

The second part of the computer is control unit. Each command programmed in the instructions is brought into the computer control unit. The control and timing unit directs which instructions in the memory are to be carried out and when they are to occur. The control unit also directs where the result of the calculation is to be stored. The computer is directed from the instructions prepared for the computer by a programmer.

The computer's storage unit serves two purposes:

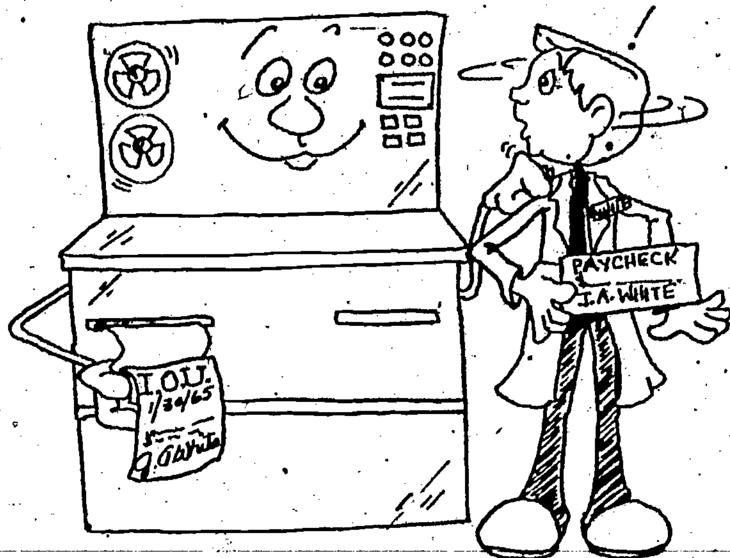
(1) It contains the set of instructions or program being used by the computer;

(2) It also contains the data being manipulated--as they are read by the input unit or calculated by the machine itself.

Memory Unit

Although the computer's memory is actually in the form of electronic devices it may be imagined as a set of many pockets. Each pocket can contain a single item of data, such as an amount or an instruction. The programmer may instruct the computer to store a certain bit of data or he/she may instruct the machine to retrieve the data. The memory of modern computers is non volatile; that is, stored information will not be erased by the passage of time, by reading it out or shutting down the machine. Data stored in the memory is erased only by storing new information in the same location.

The storage unit of a computer may be a magnetic core, magnetic drum or magnetic disk. The three different kinds of storage all work by means of a magnetized spot to show either no current or current--0 or 1.



The Central Processing Unit--CPU

The brain of the electronic computer is the central processing unit. Depending on the instructions to the processor, the arithmetic and logic unit electronically adds, subtracts, multiplies, divides, compares and moves data. These are its only arithmetic capabilities but they can be performed at lightning speed and repeated endlessly.

Processing Unit

To get an idea of the speed of a computer, one model puts in 62,500 numbers in one second. The arithmetic is done in millionths of a second. The magnetic disk storage can remember 16,000 different instructions. The answers are printed at a rate of 1,285 long lines a minute. A fast typist can type about 10 such lines a minute! Since there are no moving parts within the "brain" of the computer, when electrical impulses are read, processing of instructions may approach the speed of light.

Output

Answers stored in the computer's memory are not of any help to the user. They must be communicated before they are comprehensible to other than the computer. Luckily we

Output

don't have to speak "computerese"--instead, we receive information in decimal numbers or words we can understand.

An outstanding asset of the computer is that it works automatically. Once the instructions are entered and the program has started, the computer will continue executing until the job is complete or the problem is solved.

Software

Software is the collection of man-written ways to use data to find a solution. Software also includes specific instructions needed to solve problems with the computer. This next section is an introduction to the way a computer must have its instructions presented.

Software

Binary is the number system used by the computer. The user need not concern himself with trying to understand binary. The computer instantaneously translates, through compilers and assemblers, symbolic languages (discussed in the next paragraph) and input data, through peripheral equipment, into a binary code. In the binary number system two possibilities exist (indicated by 0 and 1) so the results of the translations to binary are represented by a combination of 0's and 1's. Figure #1 illustrates common items with two possibilities that can be represented by a 0 or 1.

Symbolic languages make it possible for almost anyone, with the proper training, to use a computer. Symbolic languages such as Cobol, Fortran, or Basic make it unnecessary to code in binary. These languages are eventually translated into binary code by compilers (software programs usually provided by the computer vendor). The symbolic languages use symbols instead of binary code. Some examples of this follow:

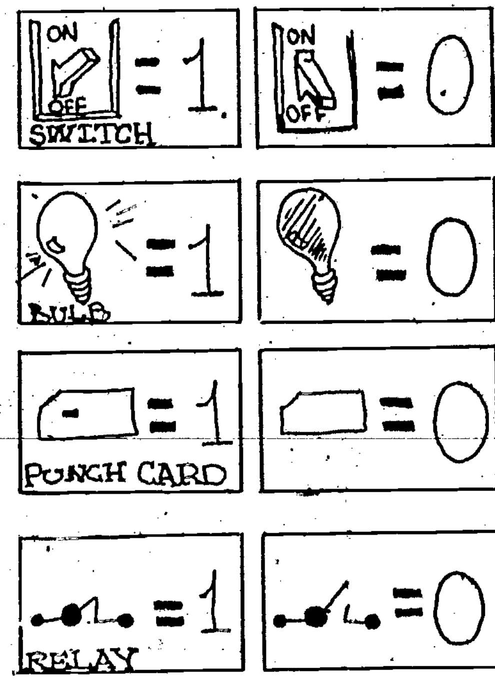


Figure 1

Function	Cobol Symbols	Fortran Symbols
Add	Add, or +	+
Equal	Equal, Equals, or =	=

Some typical Cobol instructions follow:

```
ADD CURRENT-PAY TO YEAR-TO-DATE-PAY
MOVE YEAR-TO-DATE-PAY TO PRINT-YEAR-TO-DATE-PAY
WRITE PRINT-YEAR-TO-DATE-PAY
```

As you can see, these instructions are much more meaningful to us than a binary code instruction such as:

10101011010001

Operating systems are the traffic cops of the computer. They are usually provided by the computer vendor. The more sophisticated operating systems handle many programs at one time, allowing each one a portion of time to use the central processing unit; control the input of data; and communicate with the operator through the console. Generally maintenance on operating systems is the responsibility of the vendor.

The computer vendors (suppliers) can supply users with a variety of types of standard programs. Discussion of programs is probably of no particular interest to the reader of this package and information of this type can be obtained from your data processing department. Data processing departments also can provide trained individuals (programmers and systems analysts) who will work with a user in developing systems and programs that are tailored to his needs.

SYMBOLIC LANGUAGE

Personnel

Programming is the science of getting the machine to do what you want it to do. But the science is difficult because the computer works in a language and environment completely different from man's. Program writing is a very rigid procedure. All possible contingencies have to be accounted for in the instructions. An individual who codes the instructions for a program is called a programmer.

One tool the programmer uses to try to cover all the contingencies is flowcharting. Figure #2 describes some of the symbols used in flowcharting and Figure #3 is an example of a flowchart.

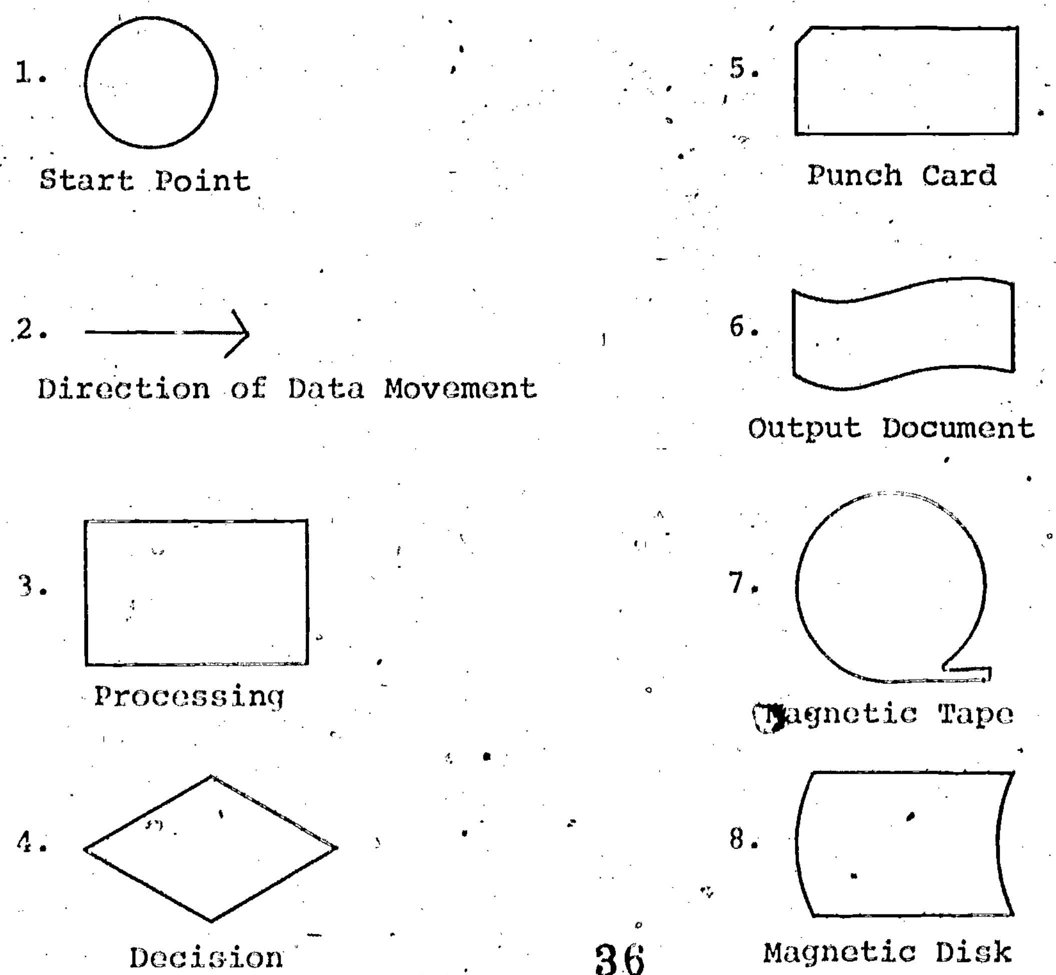


Figure #2

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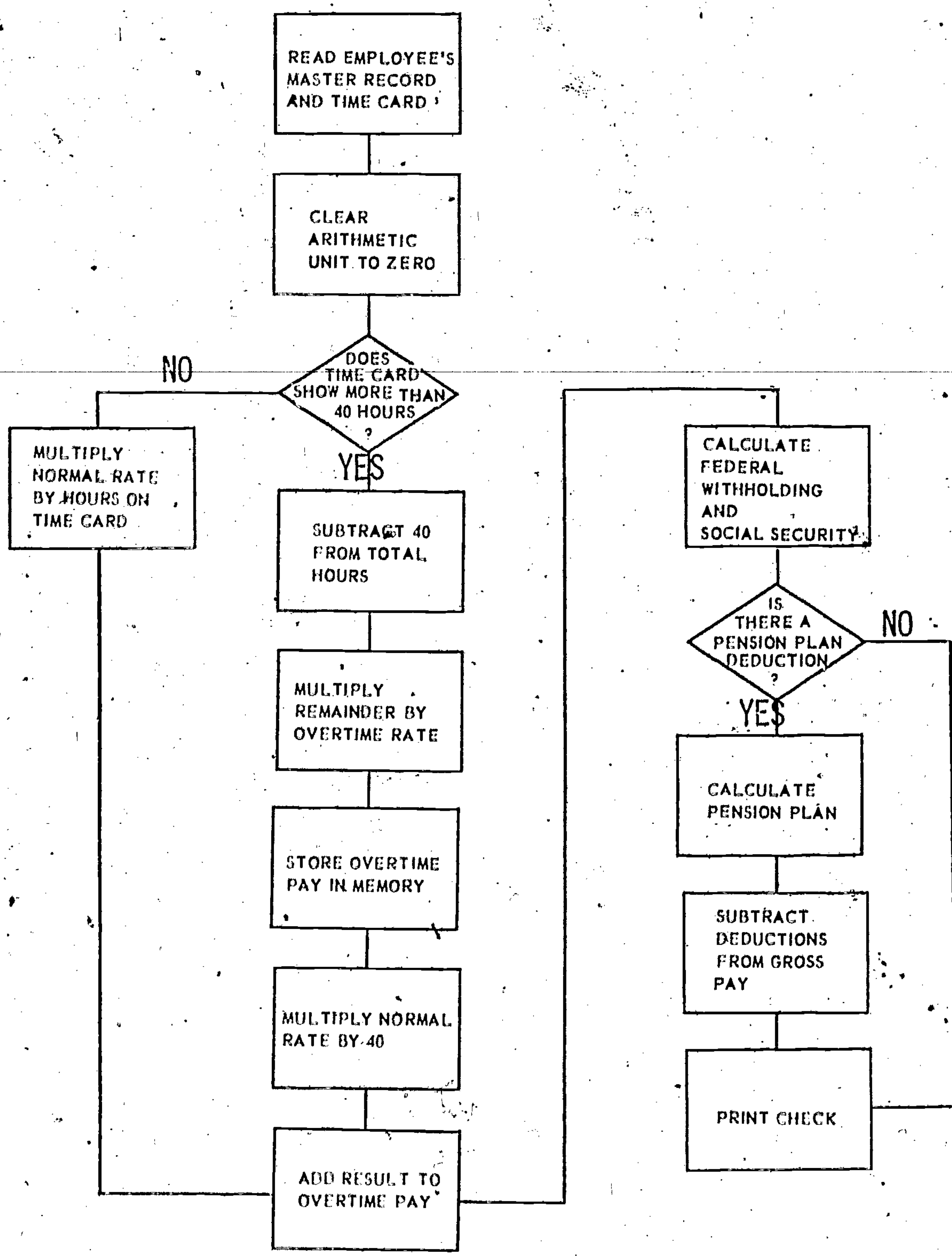

READ EMPLOYEE'S MASTER RECORD AND TIME CARD
CLEAR ARITHMETIC UNIT TO ZERO
DOES TIME CARD SHOW MORE THAN 40 HOURS ?
NO
YES
MULTIPLY NORMAL RATE BY HOURS ON TIME CARD
SUBTRACT 40 FROM TOTAL HOURS
MULTIPLY REMAINDER BY OVERTIME RATE
STORE OVERTIME PAY IN MEMORY
MULTIPLY NORMAL RATE BY 40
ADD RESULT TO OVERTIME PAY
CALCULATE FEDERAL WITHHOLDING AND SOCIAL SECURITY
IS THERE A PENSION PLAN DEDUCTION ?
NO
YES
CALCULATE PENSION PLAN
SUBTRACT DEDUCTIONS FROM GROSS PAY
PRINT CHECK

Figure #3

Systems Analyst

The systems analyst must communicate directly with the consumer and understand his project and the consumer's needs. After working directly with the consumer he must define each program in the system as well as define its function. Later he will work with the consumer and the programmer to clear up any program or repeat problems.

Computer Operators

Computer operators run the computer on a day-to-day basis. They load programs into the machine, mount tapes and disks, and carry out instructions given by the system documents.

Most computer installations have levels of programmers, analysts, and operators. The functions and responsibilities of each level are defined by the installation where they work. It is not unusual in a small installation to find one individual doing the work of all three: the programmer, analyst, and operator. In any case, the programmers and systems analysts, along with the computer operators, are the human ingredients that allow the computer to function as an important tool.

Data Collection

Keypunch Operator

Keypunch and keytape are two of the more familiar methods of preparing data for entry into the computer. The keypunch operator punches data typed or written on the source document into computer cards, figure #4. The cards are then read into the machine by the card reader. Keytape operators key the information from the source document to magnetic tape which is then read by the computer. Other forms of data collection include optical readers, paper tape, and key to disc. More sophisticated methods of preparing data for input to the computer are constantly becoming available.

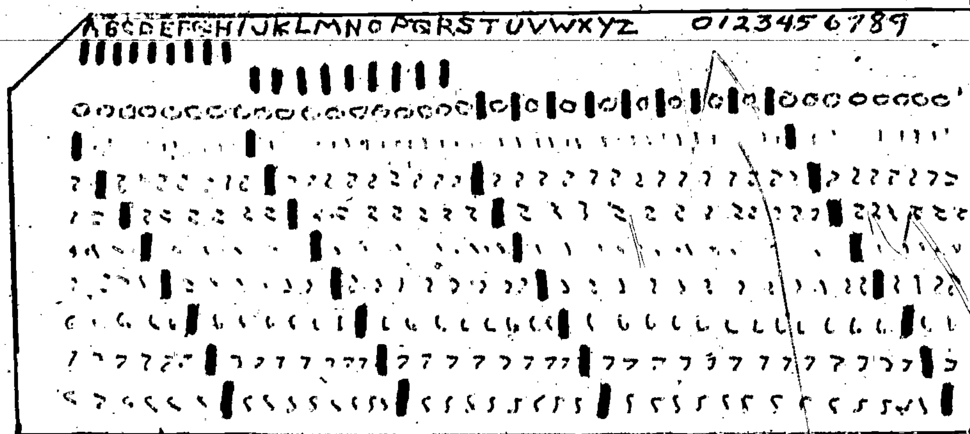


Figure #4

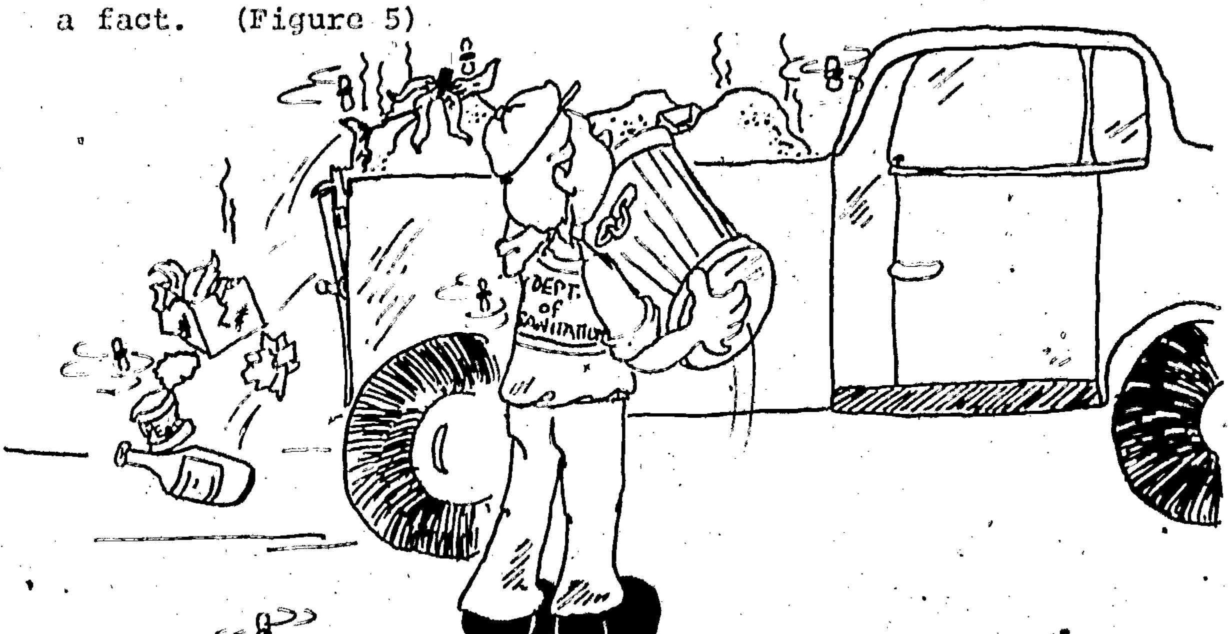
Another key person in the area of collection (and the one that most users are familiar with) is the data control clerk. The prime task of the data control clerk is to insure that the material the user has sent to be processed has, in fact, been processed and that the batch control totals sent by the user balance with what the reports print as the totals. The data control clerk works closely with the user to explain why errors occurred and what batches were out of balance as well as how to correct them.

CONCLUSION

This material has been designed to give the reader insight into what a computer is all about. The reader should realize that the computer is a tool that is only as good as the people who work with it. Without detailed instructions, the computer would sit idle.

It is important to recognize how exact the computer instructions must be. One misspelled word or misplaced period will change the results of an instruction. The programmer and systems analyst live with the realization that they are only human and that, in many cases, what they believe to be correct will in reality have some flaw that will come back to haunt them. Patience and care are necessary in working out problems with the programmer and/or systems analyst.

Input data must also be exact. One unreadable character or wrong figure will result in errors and could cause resubmission of the data. It is essential that the individuals who are preparing the data for input, realize how important they are in determining the accuracy of the final reports. There is no question that GIGO (garbage in, garbage out) is a fact. (Figure 5)



"GARBAGE IN-GARBAGE OUT"

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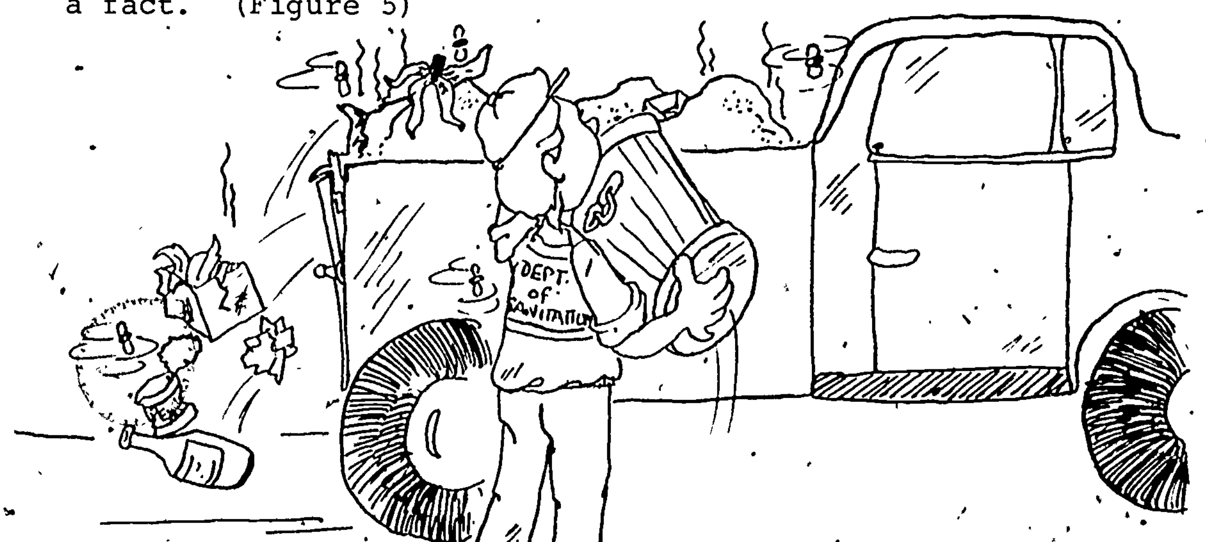


GARBAGE IN-GARBAGE OUT

The computer professional also needs to be patient. He must realize that the user may not be as knowledgeable in his field as the computer professional is about computers. Nonetheless, the user and computer professional must work together as a team, an equal partnership, to solve problems--each having some understanding of the other's job. Working under this concept, problems will be easier to resolve and the working relationship between the data processing department and the user departments greatly improve.

PROGRESS CHECK

1. The mechanical, magnetic, electrical and electronic devices of a computer are called ________________.

2. The collection of man-written solutions and specific instructions needed to solve problems is called __________.

3. The individual who codes the instructions for a program is called a ______________________.

4. The person who defines the programs and defines the functions of each program within a system is called ______________________.

5. Name one method of preparing data for entry into the computer ______________________.

6. Define GIGO ____.

7. Give an example of a symbolic language ________________

____.

8. What is the number system used by the computer? ________

____

9. Give three examples of peripheral equipment.

1. ________________________________

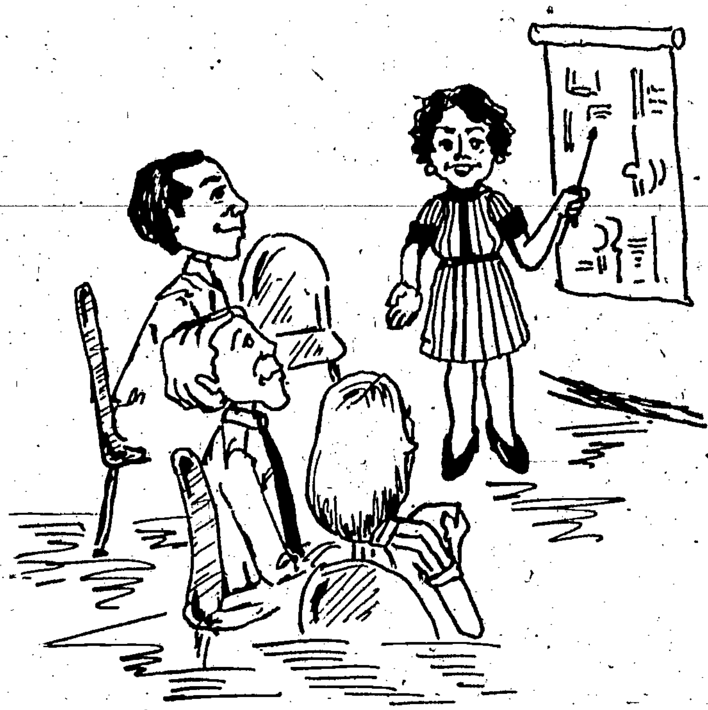
2. ________________________________

3. ________________________________

PROGRESS CHECK ANSWER KEY

1. Hardware
2. Software
3. Programmer
4. Systems analyst
5. Keypunch
   Keytape
   Key to disk
   Optical scanning, etc.
6. Garbage In Garbage Out
7. Cobol
   Fortran
   Basic, etc.
8. Binary
9. Disk
   Drum
   Tape drives
   Card readers and punches
   Printers
   Terminals, etc.

GROUP ACTIVITY



At this point it would be advantageous for the reader to tour a computer installation, preferably your district's computer center. Contact the director of the computer center to set up the tour. If there is no computer center or if it is impossible to tour your center, some alternative visitation sites are:

1. A local junior college, college or university center.
2. Another school district's data processing center.
3. A local bank's computer installation.
4. A large corporation's computer center, located in the area.

Contact the director of the computer center of the school or company you are interested in visiting for arrangements. For Keys to Tour see Appendix F.

IN-DEPTH STUDY AND PRACTICE

Training

To manage a project with care, a plan or "implementation cycle" must be followed which will result in a carefully arranged series of activities. Following the activities designed should assure the successful completion of the program.

This carefully arranged series of activities is planned jointly by the systems analyst and the school task force for developing a computer information system. At this time an old Yiddish proverb is relevant.

If the analyst and counseling group do not work together as a team, both will lose. The analyst may design a sophisticated program without help but the specific needs of any district cannot be met without regular input from the district users. Without cooperation between the analyst and district personnel, the district will never be able to design an optimum program for its own use.

The plan or implementation cycle consists of the following phases:

1. The preliminary systems evaluation and design phase.
2. The design or blueprint phase.
3. The programming phase.
4. The system test phase.
5. The acceptance phase.
6. The installation and operation phase.

(See Figure #6 on the following page)

Implementation Steps for Planning

a Counseling Computer Information System

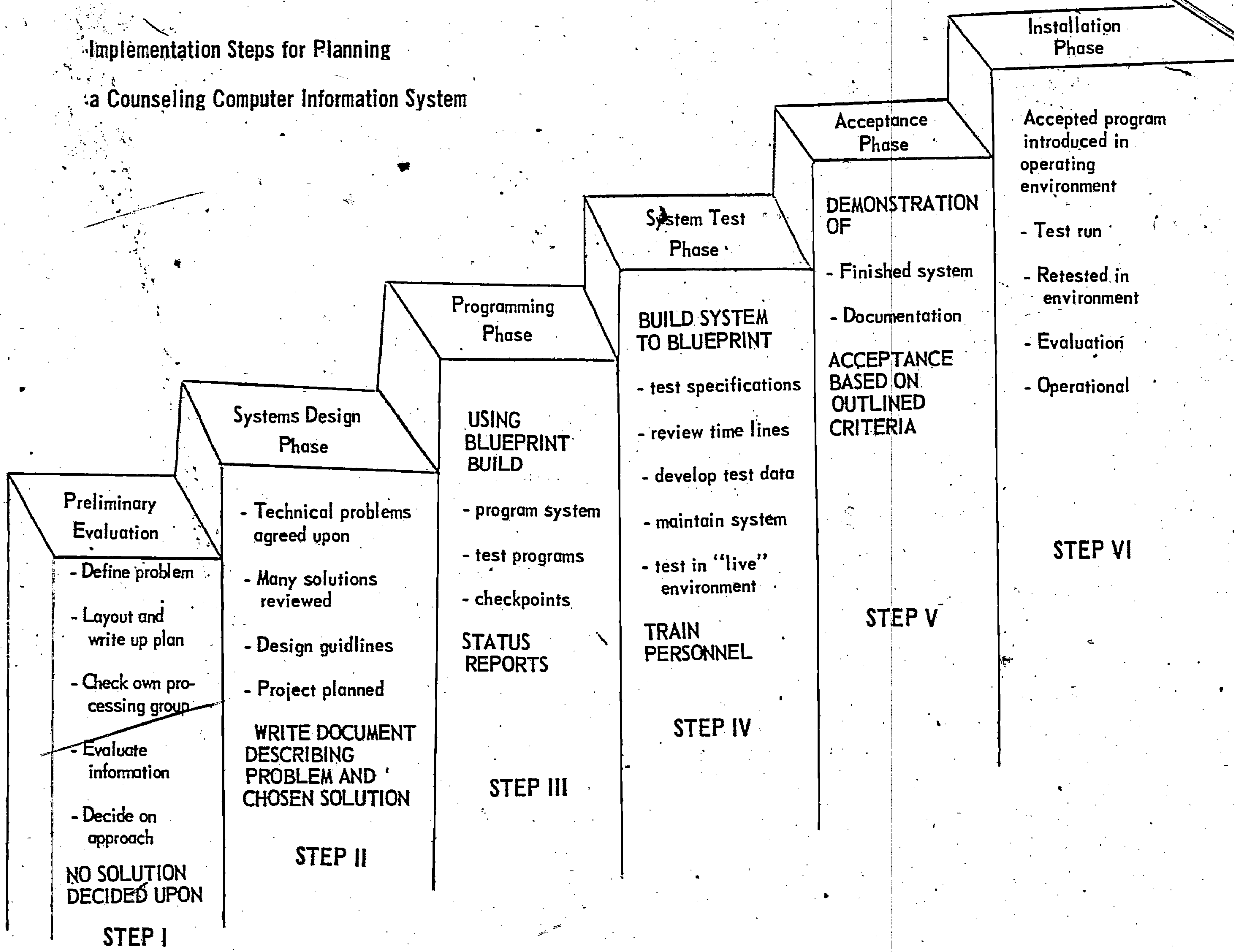
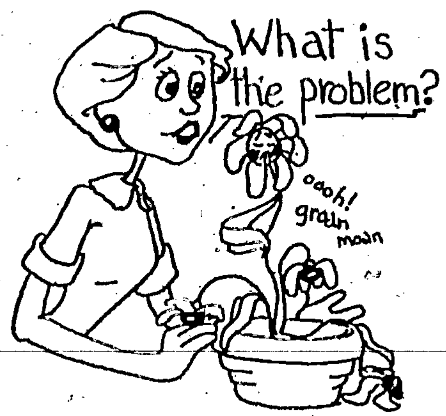


Figure #6

Step I: Preliminary Evaluation Phase

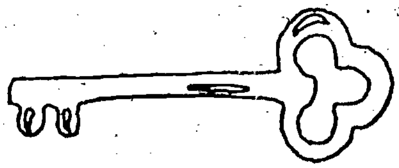


A problem is rarely obvious. Therefore, it is best not to begin trying to define it immediately. Instead, concentrate on what the problem is not, then ask, "How do we solve this?" Remember, however, that the first objective at this time is to write a document describing the problem and not the solution. This preliminary layout and write-up will be the project plan and includes the specific definition of the technical problem.

At this point, when you have defined the problem and have a concept of what you want in the way of a solution, the next step is to make a decision on what is the most logical approach to getting the reports you need. Who will work with you to design the computer information system? Using the Desired Outcomes Assessment as an example, we see there are at least three alternatives to consider. They are:

1. Designing a system that can be handled entirely by your staff (no computers--just hand calculations).
2. Asking your data processing department to help design a system using data processing computer power.
3. Look to an outside vendor who would either modify an existing computer system or develop a new computer system that will meet your basic needs.

47

 to Alternative Choices

What, then, are the key considerations in evaluating the alternatives?

The first alternative, urging the staff to design a system, is feasible if the volume of data is low and the number of calculations few. This also might be a viable alternative if time is of the essence and a computer system to do the job does not already exist.

The second alternative, using your own data processing department, is a good alternative should there be a high volume of data, many complicated computations or a combination of both. Again, a key is time! Does your data processing department have the time to spend to analyze and develop an adequate system within the given time frame. Should the data processing department happen to have an existing system that meets your need, that probably would be the best solution.

In evaluating the third alternative, outside vendors, the cost factor creeps in. Although all the alternatives cost you money and time, this alternative probably is the most costly in terms of out-of-pocket dollars. Other key considerations would be similar to considerations in alternative #2. This alternative should be considered if your own data processing department cannot meet your needs within the time frame, or the outside vendor already has what you need at a reasonable price.

I am sure the question has arisen in your mind, "How do I as a layperson make these evaluations?" Maybe you do need help.

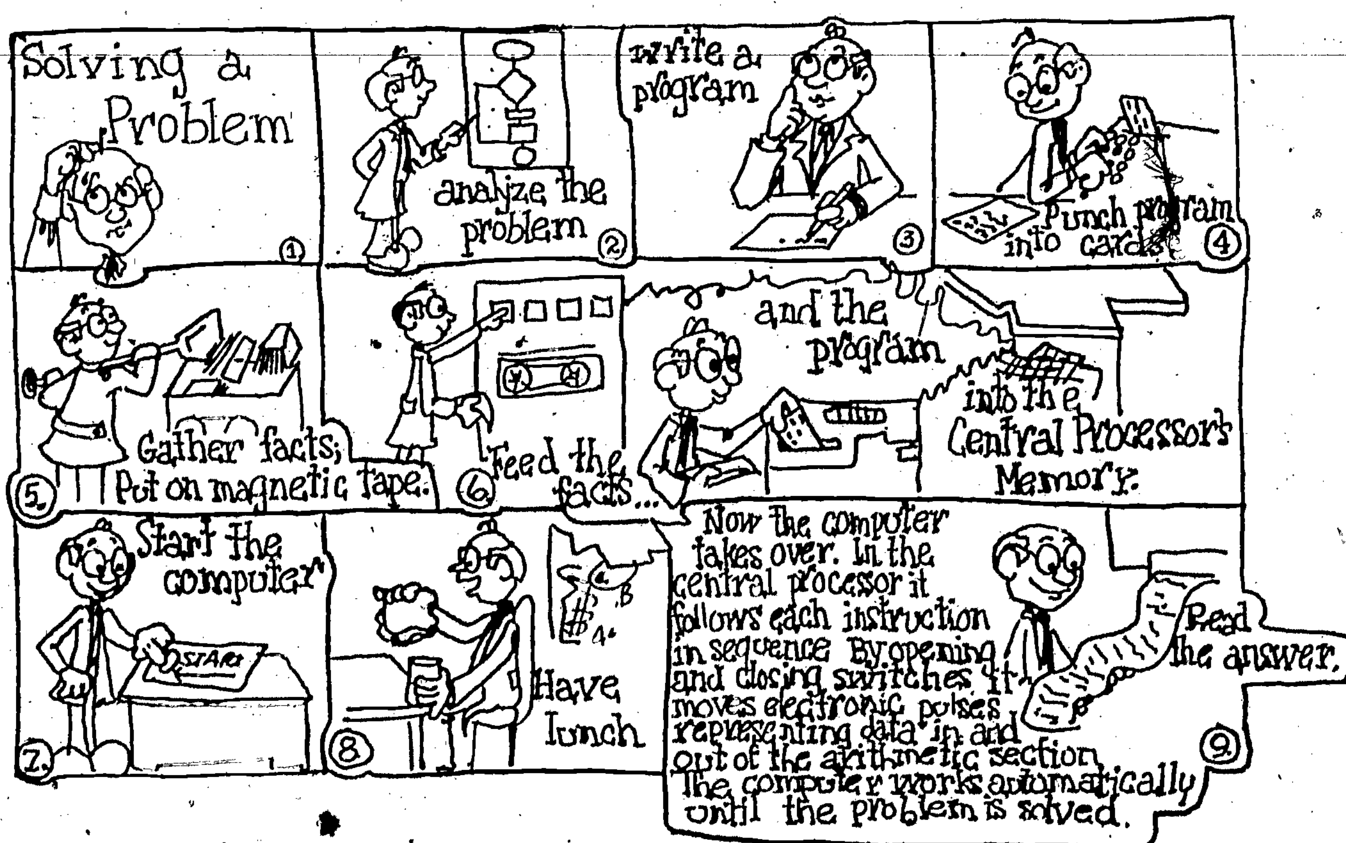
Ask yourself the question, "Who would be the most likely people available to aid me in evaluating the alternatives?" Assuming the system is for analyzing data gathered during a Need's Assessment, the following groups come to mind:

1. Do you have a research and evaluation department or access to a research and evaluation department? They can probably advise you as to what is currently available that might meed your needs. They also have had experience working with computer information systems and can help you in communicating your needs.
2. Do you have a computer information systems department (data processing)? The data processing staff can let you know what they have and what they can do for you. They may also give you insights into what's available elsewhere.
3. Do you have a consultant firm working in the district? Consultants generally have access to needs assessment reporting systems and they may be able to guide you.
4. Do you have knowledge of a consultant firm that gathers and analyzes assessment or evaluation data? Consultants usually have the necessary instruments and reporting capabilities to meet your needs in this area. If no other source is available to you, this would be your approach.

Now you must choose the alternative that you feel is appropriate for you. Document the reasons for your choice and the steps you went through to reach your decision. Present this documentation to the involved staff.

Documentation at the end of this phase should be:

1. Problem definition.
2. Alternative solutions studied.
3. Selected alternative and rationals.



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SIMULATION*

The following is a sample simulation exercise, the purpose of which is to familiarize you with the calculations involved in doing a needs assessment. When you are going through the exercise, ask yourself, "Do I really understand the problem? Who could I ask to help me understand and work at a solution to the problem?"

Proceed with the exercise and good luck!

Several students at your school have been given a series of ten needs statements (i.e., need to improve my study habits, etc.). The students were asked to choose what they felt their top three needs were. The chart below summarizes the students' choices. Your job is (1) to calculate the top need, weighing the choices as follows:

1st choice - 3 points

2nd choice - 2 points

3rd choice - 1 point

and (2) to calculate the top need by sex, using the same point calculations above.

SAMPLE

Name	Sex	Needs Statement Number 1st Choice	 2nd Choice	 3rd Choice
McKinnon	F	10	9	8

*See coordinator instructions for simulation in Appendix A.

After calculating points for McKinnon's choices needs statement, number 10 would have a total of 3 points, 2 points for needs statement number 9, and number 8 will have 1 point. The female total at this point would be the same as the overall total, but this could change.

Time yourself for this task!

TABULATION OF STUDENT CHOICES

		Needs Statement Number		
Name	Sex	1st Choice	2nd Choice	3rd Choice
Jones	F	7	1	2
Evans	M	5	2	7
Richins	M	2	6	1
Thomas	M	7	2	4
Beck	F	1	4	7
Ferris	F	1	3	2
Wilde	M	5	1	7
Johnson	M	2	5	6
Smith	F	3	2	1
Burke	F	2	1	9

WORK SHEET

Needs Statement Number	Female Total	Male Total	TOTAL POINTS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Highest Points	Needs Statement Number		
Overall	1st ______	2nd ______	3rd ______
Male	1st ______	2nd ______	3rd ______
Female	1st ______	2nd ______	3rd ______

How many minutes did it take? How long do you think it would take if you had 1,000 students to compute, more needs statements and different categories of needs statements at different levels? This is where the computer can help you.

Now that you've completed the simulation, answer the following questions:

1. Did you have a good understanding of the problem?
2. Did you ask for help from anyone:
   a. The coordinator?
   b. Other participants?
   c. Another source? (State Source)

   (If you needed help and sought it, you did the smart thing!)
3. Can you document the solution to the problem so others will understand?

After deciding which approach to take, the systems analyst and the school committee will describe their chosen solutions by:

1. Describing the problem from scratch in nontechnical terms;
2. Identifying who the customer is and what the problem environment is; *include in documents*
3. Itemizing and describing the technical problems in increasing levels of detail;
4. Being very specific about what capabilities are to be included in the system as well as what is NOT to be included.

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3. Itemizing and describing the technical problems in increasing levels of detail;
4. Being very specific about what capabilities are to be included in the system as well as what is NOT to be included.

include in documents

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In addition this document should include the definition of the problem as well as identify the end product in general terms, i.e., suggested reports, alternative approaches, report findings.

The remainder of this module deals with the assumption that you have made the decision to develop a computer information system. However, the basic principles involved in designing a computer information system apply to designing any other system. The information contained in the section would also be of advantage in evaluating existing systems.

Step II: Design Phase

It is now time to aim at your next set of objectives which include layout of the design specifications, guidelines, planning, and review with the systems analyst assigned to your project.

brainstorm for solution

Design Specifications

Design specifications are the blueprint for the program system which describes the solution to the problem and serves as a starting point for the programming.

In developing the design specification, the analyst should review with you the overall picture of the system. If your conceptual views differ from the actual system, obviously it will not function as you had planned. When you finally agree upon the overall picture, then you can move on to other areas of concern.

What to Expect From the Systems Analyst

- The analyst should presumably be skilled in finding out what you really want. Does he rephrase your statements and ask, "Is this what you mean?"

- He must state the problem in clear precise language that is understandable. Does he keep it simple? Does he simplify difficult concepts and not complicate them?

what to demand of the systems analyst

- As the systems analyst writes the program, ask to see it bit by bit. Find out what's going on early in the project.

Standards

The next area of concern a user might have is in the realm of standards. Included in this realm is designing a standard reporting procedure as well as the form which the status report will take. A decision must be made regarding which procedure will be used to write the system. For too many years data processing departments have been writing programs that are not transportable (are not usable on other equipment). Some of the commonly used transportable languages are Fortran, Cobol, and Basic. However, most manufacturers add enhancements to their languages that are not compatible; therefore, you should ask your analyst to use transportable instructions, if possible.

only transportable programs

The only concern the user should have in the area of program design is that he understand the information presented to him by the analyst. To this end, he might ask key questions about the information he is expecting to receive. The user should be satisfied that the computer is doing what it can do and is not passing back to him/her an unexpected major clerical or analytical function. The reports should not be overburdened with unnecessary data (extra totals, etc.).

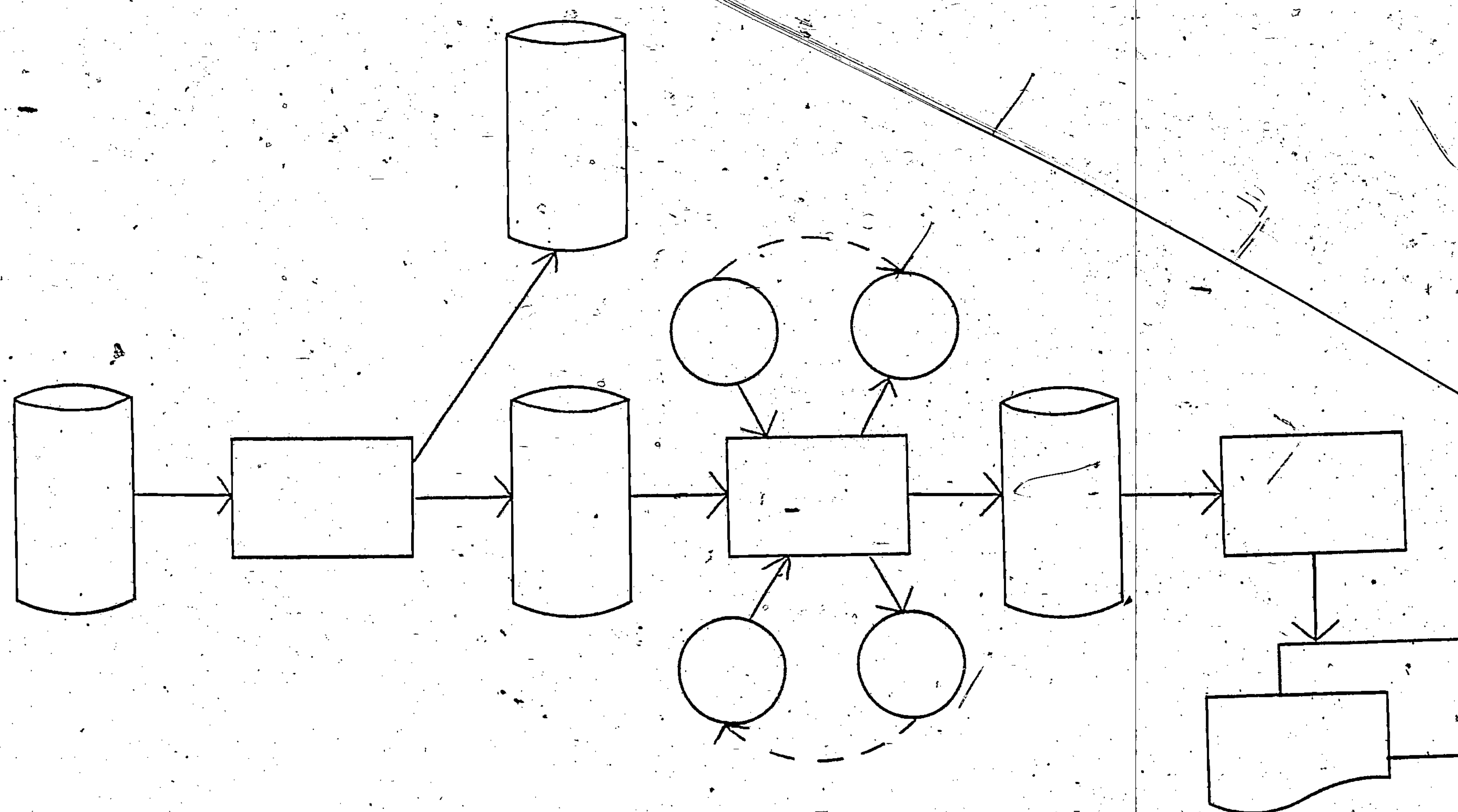
File Design

The file design should be selected by the systems analyst. To aid the analyst in selecting his file design, you might give him some insight into what you feel the future of the system is going to be. If the volume of data is going to increase, or the number of possibilities for a particular field is going to increase, he should know this now. Any changes that you foresee should be dealt with and any decisions to include or exclude an item should be agreed upon at this time. However, do not overload the system with useless and meaningless data. Always ask yourself why you want data included. Then ask yourself how it will be useful and if it will not be useful, leave it out. Trivia can destroy your system. Two major concerns to consider are (1) is there an adequate storage system for the program, and (2) where will the program's file system be stored?

file storage system

Data Flow

The flow of data through your system is a very important element of the system specifications. The systems analyst should help the user understand the flow of data through his office as well as through the computer system. The systems analyst should ask the questions, "How is the data going to be prepared for input into the system?" and "What is going to happen to the reports after the computer has prepared them?" The decisions to involve the systems analyst in the programming obviously must be acceptable to both you as the user and as a data processing representative. In either case, make sure you understand the flow through the computer system. It should be written in nontechnical terms. This, along with the flow diagrams, can be presented to upper management. (Figure #7 on following page)



SYSTEMS FLOWCHART

Figure #7

Design Guidelines

Designing a program system is basically the same as designing any other kind of system. In other words, there are reasonable guidelines that can apply to the system. The following paragraphs will describe some of these.

- Flexibility:

  This area is considered by many to be the key to the future success of a system. Can the system with limited change meet your future needs? Let the analyst know what the future needs will be and he can add them to his system design if possible. He knows the capabilities of his staff and computer system and should let you know if your requests are reasonable.

- Simplicity:

  In designing systems the authors feel that you should use the KISS principle (Keep it Simple, Stupid). If the analyst explains the system in terms that you don't understand, stop him/her. Work out the problem areas and when you understand and agree with what he is saying, proceed with the design process.

- Modularity:

  This is a difficult term; however, the concept is a good idea. It really is an extension of flexibility. If the system is broken down into subsystems or functions and the writings and flow diagrams follow this concept, you, as a user, should be better able to understand what the analyst is presenting to you.

In addition, one subsystem can be redesigned if necessary without changing the whole program.

- Minimal Expectations:

In working with the data processing analyst during the design phase you, as a user, should make it clear what your minimum expectations are. The analyst in return should outline for you what his minimal expectations are as well as what his maximum commitment will be. If there is a conflict you might try to compromise or look at alternatives for getting the information you need.

- Matrix Concept:

One tool that would be very useful to you in reviewing the system design presented by the analyst is the use of a matrix. A matrix shows the relationship between two kinds of information. List across the top of the page your input document or documents, then your report or reports. On a separate page list all the data items (name, phone, etc.) needed for each report and the number of characters needed. On the lines running down the side of the page, list these items (only one per line). Fill in the number of characters needed under each report. Go back and do the same under the input documents. If there are any conflicts or if certain items are not included on the input documents, you should catch them at this point. (Figure #8 on following page)

Figure #8

Data	INPUT Document No. of Characters	OUTPUT Work Sheet* No. of Characters
Needs Statement No.	2 Digits	2 Digits
1st Choice	2 Digits	2 Digits
2nd Choice	2 Digits	2 Digits
3rd Choice	2 Digits	2 Digits
Sex	1 Digit Code	6 Digits
Total Points	0	2 Digits calculated
Overall	0	8 Digits (constant)

*See Worksheet on page 48

This leads into another helpful idea in designing systems. When developing your system, first design the reports and work back to the input documents and output reports. You might find this suggestion helpful: In simple terms, you first need to know what you want, then you can decide how to get there.

At this point, the analyst should have completed and documented:

1. Guidelines for designing the system.
2. Specifications
3. File design.
4. Report layouts (Figure #9)
5. Input document design (Figures #10 and #11)

ADULTS, NINTH GRADE

TABULATION BY POSITION: TEACHERS NEEDS GROUP A: ACADEMIC-LEARNING

Date: 02/19/73 Time: 8.52 Relative Cases = 65 Total Cases = 156

NEED NUMBER	1st CHOICE	RANK	2nd CHOICE	3rd CHOICE	4th CHOICE	5th CHOICE	WEIGHTED MEAN	RANK	RELATIVE PERCENTAGE	RANK
1	1	19.	0	1	2	1	2.6000	24.5	7.7	21.
2	0	0.	5	1	1	2	3.0000	14.5	13.8	13.
3	6	3.	11	7	9	2	3.2857	6.	53.8	1.
4	2	13.5	3	2	5	1	3.0000	14.5	20.0	8.5
5	0	0.	0	0	0	1	1.0000	32.	1.5	31.5
6	1	19.	0	3	2	1	2.7143	22.	10.8	17.
7	0	0.	0	0	0	1	1.0000	32.	1.5	31.5
8	6	3.	6	3	4	4	3.2609	7.	35.4	4.
9	2	13.5	0	3	2	3	2.6000	24.5	15.4	12.
10	3	8.5	0	2	1	2	3.1250	8.5	12.3	15.
11	3	8.5	0	3	4	1	3.0000	14.5	16.9	10.5
12	0	0.	3	5	1	2	2.8182	19.	16.9	10.5
13	3	8.5	4	2	2	4	3.0000	14.5	23.1	7.
14	5	5.5	8	3	7	4	3.1111	10.	41.5	2.5
15	0	0.	2	1	0	1	3.0000	14.5	6.2	25.5
16	2	13.5	1	2	2	1	3.1250	8.5	12.3	15.
17	2	13.5	2	3	1	0	3.6250	3.	12.3	15.
18	0	0.	2	7	2	2	2.6923	23.	20.0	8.5
19	1	19.	1	1	1	1	3.0000	14.5	7.7	21.
20	0	0.	0	0	1	0	2.0000	28.5	1.5	31.5
21	1	19.	0	1	0	2	2.5000	26.5	6.2	25.5
22	0	0.	0	0	0	1	1.0000	32.	1.5	31.5
23	0	0.	1	0	1	4	1.6667	30.	9.2	18.5
24	1	19.	1	0	1	1	3.0000	14.5	6.2	25.5
25	0	0.	1	0	0	1	2.5000	26.5	3.1	29.
26	0	0.	2	1	1	1	2.8000	21.	7.7	21.
27	2	13.5	0	1	1	0	3.7500	2.	6.2	25.5
28	2	13.5	0	2	0	2	3.0000	14.5	9.2	18.5
29	5	5.5	5	2	3	3	3.3333	5.	27.7	5.
30	7	1.	2	2	1	4	3.4375	4.	24.6	6.
31	6	3.	3	4	8	6	2.8148	20.	41.5	2.5
32	0	0.	0	2	0	2	2.0000	28.5	6.2	25.5
33	3	8.5	1	0	0	0	4.7500	1.	6.2	25.5
34	0	0.	0	0	0	0	0.0000	0.	0.0	0.
35	0	0.	0	0	0	0	0.0000	0.	0.0	0.
36	0	0.	0	0	0	0	0.0000	0.	0.0	0.
37	0	0.	0	0	0	0	0.0000	0.	0.0	0.
38	0	0.	0	0	0	0	0.0000	0.	0.0	0.
39	0	0.	0	0	0	0	0.0000	0.	0.0	0.
40	0	0.	0	0	0	0	0.0000	0.	0.0	0.
OMITTED	1		1	1	2	4	2.2222		13.8	

Figure #9

DATA COLLECTION INSTRUMENT

The information you provide today will be anonymous--you do not have to sign your name to this form. There is only one piece of biographical information which will help us understand the groups of students who participate in this study. Please answer the following questions by placing a checkmark in the appropriate space.

Biographical Information

Grade: 1. Ninth-Tenth ____ 2. Eleventh-Twelfth ____

- -

DATA SHEET

(In the appropriate place, write the number of the statement the student selected.)

1. NEEDS	1st Choice	2nd Choice	3rd Choice	4th Choice	5th Choice
GREEN Academic Learning	____	____	____	____	____
BLUE Educational and Vocational	____	____	____	____	____
ORANGE Interpersonal	____	____	____	____	____
YELLOW Intrapersonal	____	____	____	____	____

2. WANTS ASSISTANCE	1st Choice	2nd Choice	3rd Choice	4th Choice	5th Choice
GREEN Academic learning	____	____	____	____	____
BLUE Educational and Vocational	____	____	____	____	____
ORANGE Interpersonal	____	____	____	____	____
YELLOW Intrapersonal	____	____	____	____	____

3. Order of top eight choices for assistance:

1st Choice	2nd Choice	3rd Choice	4th Choice	5th Choice	6th Choice	7th Choice	8th Choice
____	____	____	____	____	____	____	____

Figure #10

GRADE: 1. Ninth ____ 2. Eleventh-Twelfth ____

4. Write below any "wants" which you selected in your top 20 "Choices for Assistance" that were not covered in the four decks. (Those which you wrote out.)

   Academic Learning Needs (Green) ______________________________

   ____

   Educational and Vocational Needs (Blue) ______________________

   ____

   Interpersonal Needs (Orange) _________________________________

   ____

   Intrapersonal Needs (Yellow) _________________________________

   ____

5. Write below any other areas or categories of needs which are important to you that were not covered by the four decks of cards used. Try to be specific and clear in your responses.

6. Write below any general reactions or comments about this interview or the needs assessment procedures.

7. Write below any additional information you wish to volunteer regarding the needs you selected or your reasons for selecting them.

8. Write below any comments or suggestions about current and possible future counseling and guidance programs and services in your high school.

Figure #11

Project Planning

Test Specifications - The key concern of the user in the area of project planning is how much of his staff's time it will take during the remaining phase and which of the responsibilities the staff will be responsible for.

time limitations

In the area of testing, the user should be involved in the development of "live" test data for the system test phase. ~~The better the test data, the more certain you can~~ be that the system will work and that all contingencies have been covered.

live data

Documentation standards are the key to the long term success of a system. This is the time you sit down with the systems analyst and decide what you need in the way of further documentation. Make sure the documentation is what you want and that it is complete. The activities you go through in this package should help you decide what you need.

Training is another important concern for the user. What is it going to take for the staff to understand and use the system? A good system is a system that is simple to use from input to output. You, as the user, make a system that will work or not work. If members of the staff are relatively pleased with the system and are willing to work with it, they will make the system work. When you are planning your training sessions, be concerned about the feelings expressed by the personnel being trained. Provide genuine opportunities for specific input from the staff who will be using the program. In addition, be sure to emphasize that an important resource is the intelligence and experience of participants.

This will help build a more practical and usable program. The side benefit of increased pride will add to the success of the system.

Resource estimating is the most difficult area with which to work. The key element, of course, is time. An old data processing theory is that you estimate the time it should take, double it and still expect to be a few days late. Negative as this saying may seem, it is based on the theory that you can never cover all contingencies. This may be true but with the proper system design and guidelines, many of the contingencies can be foreseen. Time will dictate when and what resources within your department need to be used. In looking at time with the systems analyst you should ask him to give you three dates. They are:

1. Earliest possible completion date.
2. Most likely completion date.
3. Latest possible completion date.

After the three dates have been provided, some discussion will have to be made regarding when and for how long the systems analyst will need help from you and your staff. In your planning, always include all possible delays in the timetable. Develop what you consider key checkpoints (points where you can see some results) and monitor them with key staff.

Characteristics of a Good Program

The plan presented to your group will be a roadmap showing you how to get from your present position to your goal. You may ask of the plan:

- Is it written and not stored in someone's head?
- Does it describe what the job is, how it will be confronted and list the resources required to do it?
- Is it written with care and continuity?
- Is it brief enough so those concerned will read it?
- Is it indexed?

what to look for in a well planned program

REVIEW OF DESIGN PHASE

The review of the design phase with the systems analyst is probably the most critical review of all for it is the point-of-no-return.

Now is the time to make a presentation to key personnel who should be aware of the project. Preparation will, of course, depend upon who will be there and what results you expect from the presentation. These details should be worked out with the systems analyst. Give him/her whatever help you can in preparing aides (flip charts, handouts, finding a meeting place, etc.) necessary for a clear presentation. Remember, you are working as a team. He/she needs you and you need him/her.

The following is a guideline for you in developing your presentation. Cover what you feel is necessary--too much is as harmful as too little. Good luck!

I. Introduction

   A. Background on department

   B. Need for system

   C. Overview of preliminary evaluation

D. Overview of design

E. Schedule

F. Resource requirements

G. Limitations

II. Plan

A. Overview

B. Detail resource plan including timelines

C. Status reporting documents

III. Design

A. Output design and philosophy

B. File design and philosophy

C. Program overviews

D. Input design and philosophy

IV. Current Status Report

A. Status

B. Problems

C. Matters for approval

D. Plans before next review

E. Next review date

F. Attachment of time chart

REVIEW THE REVIEW

Next go over the results of the review with the systems analyst. This is your final shot at making any major conceptual changes. Make any necessary last minute major changes at this point and start into the programming and systems test phase.

complete review

At the end of this phase you should have the following:

1. Preliminary evaluation documentation
2. Design documentation
   a. Design specs
   b. Design guidelines
   c. Flow diagrams
   d. Output designs
   e. Input designs
   f. Schedule

Approval and acceptance of what has been completed is necessary from all parties involved. All should indicate their approval by signing and dating the documentation. This helps in two ways. First, it guarantees all interested parties have seen the design and, second, it will help in any controversy which may arise about who did or did not agree with the design.

Step III: The Programming Phase

This phase is controlled by the computer information systems departments. Your concern herewith will be in making sure you have good communication procedures. These procedures include identifying the check points, and controlling change and status reports.

The check points you identify during the design phase are not the key to the success of your project--too many other elements interplay. If lateness in meeting a schedule, i.e., slippage, should occur you may have to renegotiate the checkpoints with the systems analyst. Remember, *slippage* the squeaky wheel gets the oil. But squeak intelligently and reasonably--if you need help!

Hopefully, all the necessary major changes have been made to this point. Any major change from now on will throw your schedule off and your project may be out of control. However, minor changes are expected during this phase. They are prompted by more insight from either the systems analyst or programmer. Your procedure for handling these should be outlined and the most important concern is to get the job done. Enhancements are nice, but if they delay implementation of the system, they may not be worth the effort. That should be clear to everyone involved in the project.

major changes

Request weekly status reports from the analyst. These can be formal or informal. You might have the systems analyst use the following format:

weekly status report

STATUS REPORT

1. Status
2. Problems
3. Matters for approval
4. Plans for next week

(Example in APPENDIX C)

But remember, status reports are a good history of what has happened in a project so don't be too informal about them. They will be of benefit both to you and the systems analyst.

Step IV: System Test Phase

The first order of business is to review with your systems analyst the test specifications developed in the design phase. Make sure you take into consideration any changes you make during this programming phase.

review test specifications

After reviewing the specifications, you need to review the time lines. Has anything changed that could either speed up or defer your implementation date? Make this decision with the systems analyst and then proceed toward your target date.

One key concern has always been good test data (samples of input to the system). If the person who programs the systems develops the test data, any incorrect assumptions that he has will be reflected in the test data. Therefore, including the systems analyst, the programmer and another one of your key personnel in developing the test data will enable all the wrong assumptions to surface simultaneously. You can then work them out together.

training personnel

Your next concern is training of a task force. You and the systems analyst should review the training plan developed in the design phase. Plan the session to cover an overview of the system and then focus on the area with which you need to be concerned. Remember, key personnel need to (1) know why and what they are doing and (2) feel that their job is important to the success of the system.

plan for future changes

The last element of this phase is setting up a procedure to request future changes in a system. Most analysts like to have a moratorium on changes until the system has been implemented for some period of time. If possible, comply with this request. However, changes are inevitable and developing a procedure is essential to the successful completion of these changes. Remember, you may not be there when the changes are necessary; therefore, the procedure must be understandable to someone who does not have any background in the system.

The keys to this phase are:

1. Review test specifications
2. Review timelines
3. Develop good test data
4. Train your people
5. Develop procedure for change

<u>Acceptance Test Phase</u>

At this point in time, the user sits down with the systems analyst and writes the acceptance test specifications. In other words, what will your department need to see before deciding the system is acceptable to you? The following should be considered and checked by you: *acceptance specifications*

1. Check all reports for format and accuracy, including subtotals and final totals.
2. Check all input documents for completeness.
3. Check flow of data from preparation of input through the output cycle (pay particular attention to how much time each step takes).

4. Have more than one person go through the first three steps.

5. Review processing time commitments with analyst, deleting vague statements (e.g., timely manner, customer's assistance).

All statements should be specific as to time and responsbilities.

Documentation at this point should include the following:

1. Preliminary evaluation report
2. Systems design phase documentation
   a. final report layouts and printouts
   b. Short program narratives
   c. File design and philosophy
   d. Input documents
   e. System flow chart
   f. Processing time commitments
   g. User training materials (planning phase--acceptance plan).

All documents should be signed and accepted by all parties involved, that is: analyst, counselor and appropriate staff.

Step VI: Installation and Operation Phase

The next necessary step is to prepare your area for the change. Review the flow through the department as you perceive it. Be concerned with how the data gets to your people, preparing output to data processing, what *flow review* happens when the computer reports come to your office and where they go next. If the reports leave your office at that point, you may think your responsibility ends. But be careful! You may want to keep a master copy which never leaves your office to guarantee that you will always have what you need. When a report is no longer valid, get rid of it.

test run procedures

After the total procedures have been documented, test run them. Take some "live" (actual) data and run it through these procedures. Make and document any change you can see that would smooth out the operation. Continue doing this until you feel comfortable about the flow. The systems analyst may be able to give you some insight into this process.

Once you are satisfied with the process, take a look at the whole picture. Are you satisfied with what you've got? Are you satisfied with your documentation? Do not "sign off" (completely accept) the system until these answers are "yes." Particularly be careful of the documentation. The list of documentation for final sign off should include the following:

"sign off" list for documentation

1. Preliminary evaluation report
2. Systems design phase documentation
3. Report layouts and printouts
4. Short program narratives
5. File design and philosophy
6. Input documents

7. System flow chart

8. Processing time commitments

9. User training materials

10. Flow of data through department

11. Number of copies

12. Distribution of reports

13. Retention procedures

(See Appendix E)

Now you are ready to start! Remember that we learn from our mistakes. A computer information system is yours for the asking...or the designing. Design away!

APPLICATION PROCEDURES

Think about what you have read and experienced as you have progressed through this module. Answer the following questions with those experiences in mind.

1. What computer services are currently being supported in your district?

2. What computer services are available to you from outside your district? Identify these sources.

3. Identify possible sources of funding for development of a computer system to summarize your needs statements.

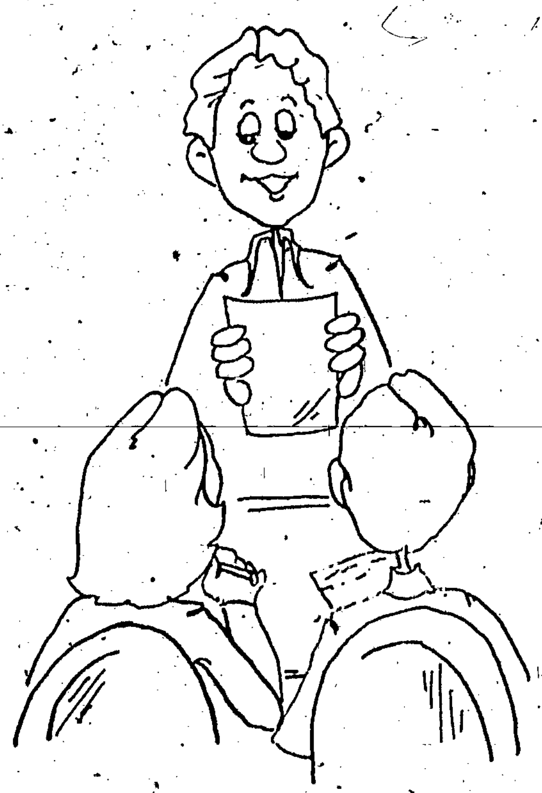
4. Identify the personnel in your department who will be working with you on the project.

5. What higher level administrative personnel should be aware of or involved in the project?

6. To whom should the reports be presented and why?

7. Outline the procedure you would go through to develop a computer system for the purpose of aiding the needs assessment process.

POST ASSESSMENT



1. What are the six major steps in developing an effective Computer Information System? (p. 40)

   A. ____________________ D. ____________________

   B. ____________________ E. ____________________

   C. ____________________ F. ____________________

2. In evaluating alternative approaches, what are three ways that a department can handle various information processing tasks? (p. 42)

   A. ____

   B. ____

   C. ____

3. A. What is the title of the person who assists individuals in the development of computer application to solve educational problems? (pp. 33 & 51)

   ____

B. State three important items to stress when designing a Data Processing System. (pp. 50-65)

(1) ______________________________

(2) ______________________________

(3) ______________________________

4. A. What is a major concern you should have during the programming phase of the development of a Computer Information System? (pp. 65-68)

____

B. Name three objectives that should be achieved to successfully complete the systems test phase. (pp. 67 & 68)

(1) ______________________________

(2) ______________________________

(3) ______________________________

5. No item, objective is related directly to the completion of the module. (pp. 61-62, 67-68)

6. What is the significance of having individuals other than the programmer develop test data? (p. 67)

____

____