DOCUMENT RESUME

ED 267 733 IR 012 006

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TITLE Notebook on Computer Literacy Training. A Plan for Computer Literacy Training for School Personnel.
INSTITUTION Lesley Coll., Cambridge, Mass.
SPONS AGENCY Department of Education, Washington, DC.
PUB DATE 84
NOTE 63p.
PUB TYPE Guides - Non-Classroom Use (055) -- Reports - Descriptive (141) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Bilingual Education; *Computer Literacy; Curriculum Design; *Curriculum Development; Elementary Education; *Elementary School Teachers; *Inservice Teacher Education; Needs Assessment; Objectives; Program Descriptions; *Teacher Aides

ABSTRACT

This document is designed to assist educators, trainers, instructional designers, program planners, and Title VII program directors involved in the computer education of bilingual children. The presented information will assist in identifying target learner needs in the area of computer utilization and applications. The document describes an initial effort for computer literacy training directed towards the specific needs of a specific group of teachers and teacher assistants at the Silvia School Local Educational Agency (LEA) in Fall River, Massachusetts. The target population consisted of a group of learners who are elementary school teachers and teacher assistants involved in the teaching of bilingual (Portuguese/English) children. The methodology selected for instructional curriculum mapping for each unit of training is a combination of the procedural and hierarchical approaches. This was determined by the nature of the topics of the curriculum, which involved such domains of learning as verbal informa ion, intellectual skills, motor skills, cognitive strategies, and implicit attitudes throughout the curriculum. A needs analysis was the first critical step in identifying the content to be addressed during the short-term computer literacy training. The document includes the following sections: Preface; Rationale; Front-End Analysis; Goals and Objectives; and Training Program Outline. Appendices include: Sample Needs Assessment Instruments, Courseware Evaluation Protocol, News Release, Certificate of Participation, and Sources and Resources. (THC)

# NOTEBOOK
# ON
# COMPUTER LITERACY TRAINING

## A Plan
## For Computer Literacy Training
## For School Personnel

By

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Fall, 1984

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Evaluation, Dissemination and Assessment Center,
ESEA Title VII, Lesley College
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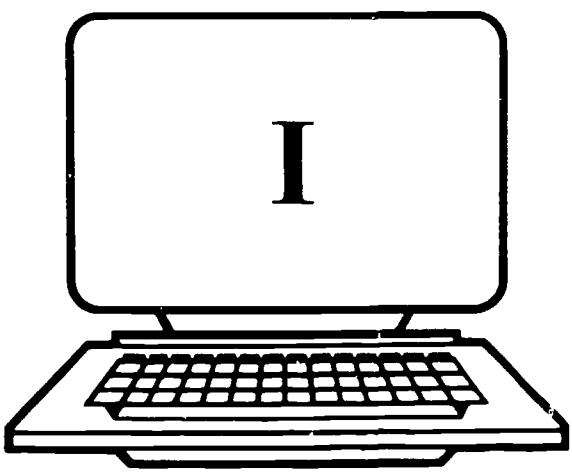
Cambridge, Massachusetts 02140

The activity which is the subject of this publication was supported in whole or part by the U.S Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the Department of Education, and no official endorsement by the Department of Education should be inferred.

The Evaluation, Dissemination and Assessment Center for Bilingual Education is a special ESEA, Title VII project funded by the U.S. Department of Education through Lesley College, Cambridge, Mass. and the Fall River Public School System.

This publication was developed and printed with funds provided by Title VII of the Elementary and Secondary Education Act of 1965 as amended.




# Preface

# Contents

# I. PREFACE

The documentation work has been prepared by Dr. Martha D. Mylona for the Evaluation, Dissemination and Assessment Center (EDAC) at Lesley College. The purpose of this effort is to assist those educators, trainers, instructional designers, program planners and program directors who have one thing in common: the computer education of linguistically and culturally different children.

For educators, especially teachers and teacher assistants, the presented information will assist them to identify target learner needs in the area of computer utilization and applications.

Teacher trainers and instructional designers will be able to use the training curriculum outline, adapt and update the training objectives and instructional strategy to match their own target trainee populations and to meet specific training needs. Program planners will find this document helpful in a sense that it can be used as a sample computer literacy training to be included in their Title VII proposals for teacher training, basic and demonstration projects. Finally, program directors may find the information presented in this document helpful in their efforts to include a computer literacy component for both student training and teacher/staff development seminars on computer literacy (knowledge and skill).

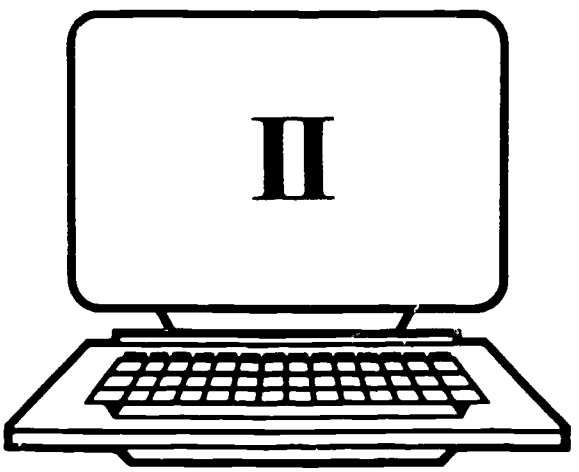
A needs assessment was conducted and a panel of experts in bilingual education and computer applications was contacted to assist in the identification of training goals and objectives.

This document presents an initial effort for computer literacy training directed towards specific needs, of a specific group of teachers and teacher assistants, at the Silvia School LEA (Local Educational Agency) in Fall River, Massachusetts.

It should be pointed out that the training curriculum described nere has not been subjected to the rigors of scientific evaluation due to the fact that the Fall River site has been the first field trial site for the formative evaluation process which is an integral part of the development phase in instructional systems design. It is expected that other LEAs will be involved as additional sites for the EDAC's computer literacy training formative evaluation and validation procedures. Thus, the curriculum described can be updated and improved based on additional field trials and beta testing.

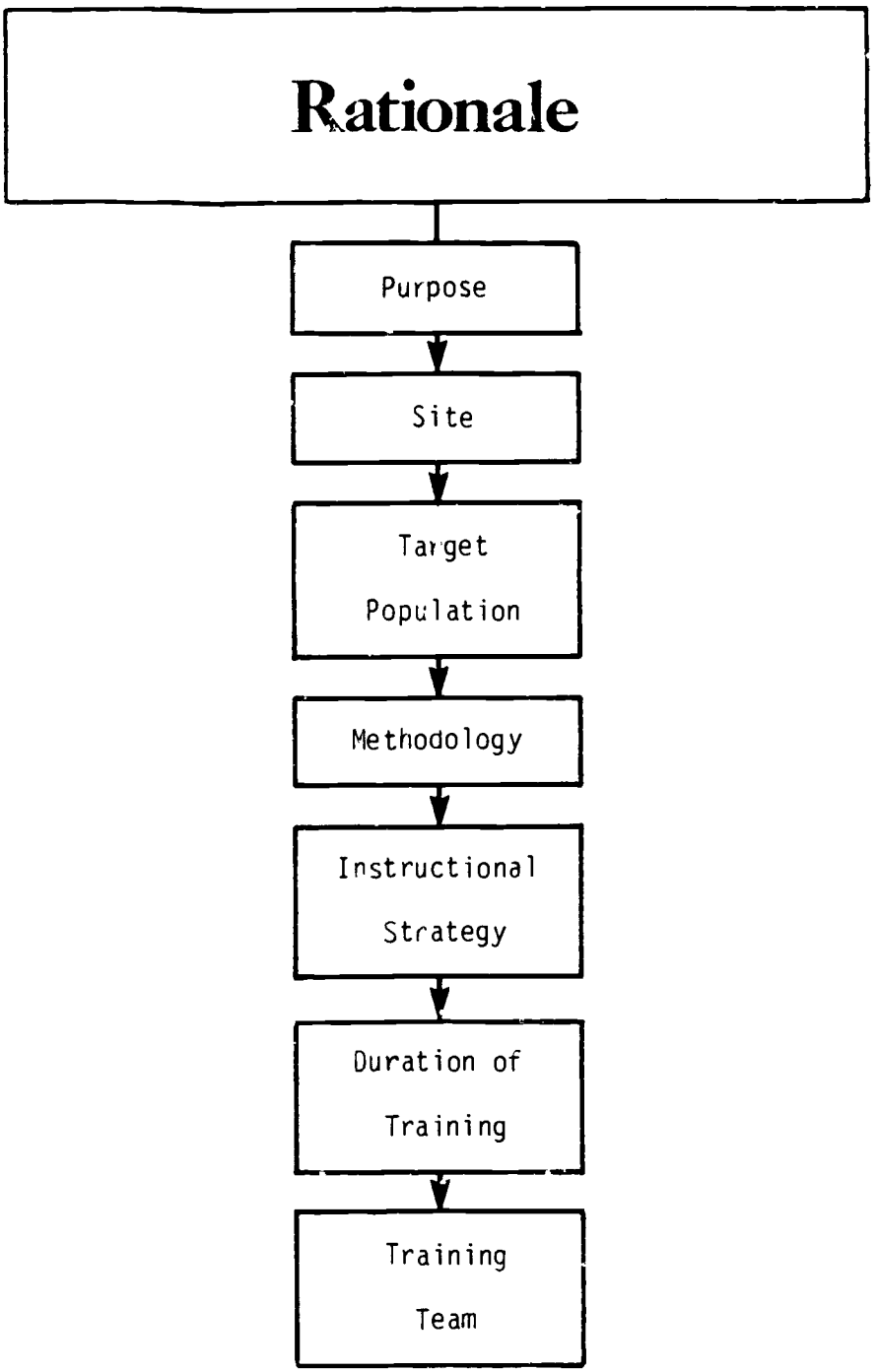
The impact of computer technology has become evident in most aspects of our lives. Microcomputers have already satisfied needs, wants, and wishes in the home, business, government, industry and, recently, educational environments. Elementary school children, in general, have been very receptive and fascinated with the new learning tools of the electronic age. Most children, however, may just play arcade games if their teachers are not trained to take advantage of computers and their enormous educational applications. If bilingual teachers are to be competitive, informed, and productive professionals, they must become computer literate. But what is computer literacy?

Computer literacy, as a subject to be learned, means different things to different people. For our purpose, here, the intent of this short-term computer literacy teacher-training program is to provide teachers and teacher assistants of K-6 students with knowledge and skill on the capabilities, applications, and social implications of the microcomputer.



# II

# Rationale


Rationale
Purpose
Site
Target Population
Methodology
Instructional Strategy
Duration of Training
Training Team

## II. RATIONALE

The development and implementation of a computer literacy curriculum to train teachers and their assistants who work with LEP children is an important and timely task. Aside from the issues of equal educational opportunity, bilingual educators, parents and LEP children alike demand and deserve a fair share of what computers and software have to offer. Bilingual program directors are faced with complex decisions on the types of hardware, the purpose and quality of software, and the kind of training required for the teachers and students to fully utilize the capabilities of the new technology. Every day, more teachers and administrators want to know more things about what computers can and cannot do in the instructional and administrative domains.

Bilingual education is ready to participate in the national effort to bring computer technology and educationally-sound courseware to the classrooms of America. One good starting point is computer literacy.

Computer literacy, like bilingual education, means different things to different people. In the context of this work, computer literacy has been defined as knowledge of computer capabilities and ability to use appropriately programmed computers to assist in instructional and administrative tasks.

All issues of equity and equal educational opportunity aside, the EDAC at Lesley College has recognized the immediacy of computer literacy training needs of bilingual school personnel. This has been reflected in the development and implementation of a computer literacy short-term training curriculum for one school site at Fall River, Masssachusetts.

### PURPOSE OF THIS PUBLICATION

As described in the preface section of this document, this publication is

intended for an audience of Title VII program directors, program planners/proposal developers, instructional designers, trainers, and educators involved directly or indirectly with the computer education of bilingual children.

Due to the fact that this document presents an initial computer-literacy effort for a specific group of trainees, at a specific site, the content presents an account of "how it was done" rather than a "how it should be done" guide.

The author believes that there is no one "correct" or "incorrect" method for computer literacy training, as there is no one "correct" or "incorrect" approach to bilingual/ESL education. Given the right conditions (internal and external), both computer literacy training and bilingual education can be successful as long as the curriculum goals reflect real learning needs and environments in which learning must be applied. With this in mind, the reader will be able to tolerate the assumed value of the described curriculum.

## SITE SELECTION

The Silvia Elementary school at Fall River, Massachusetts was selected to be the computer literacy training site for the following reasons:

1. It is the home of a Title VII Local Educational Agency (LEA).
2. It is closely involved with most EDAC activities and coordination efforts.
3. Administrative and school personnel were very supportive.
4. Teachers and their assistants were eager to learn about computers.
5. The site is within commuting distance from the EDAC.
6. Scheduling arrangements were acceptable to both trainers and trainees.

## TARGET POPULATION

As stated earlier, the target population consisted of a group of learners who are elementary school teachers and teacher assistants involved in the teaching of bilingual (Portuguese/English) children. The group consisted of 24

trainees with a proportionate bilingual teacher, monolingual teacher, and teacher assistant ratio.

A unique feature of this group was its homogeneity in terms of respect for each others' roles, and a motivation to learn about computers. The target trainees were all volunteers to the short-term training and any individuals who were "undecided" or self-proclaimed "computerphobics" were allowed to leave the training after the first orientation session (only one person decided to be excluded from training).

## METHODOLOGY SELECTED

The methodology selected for instructional curriculum mapping for each unit of training is the combination of the procedural and the hierarchical approaches. This was determined by the nature of the topics of the curriculum which involved such domains of learning as verbal information, intellectual skills, motor skills, cognitive strategies and implicit attitudes throughout the curriculum..

The domains of training/learning outcomes included the following:

| | | |
|---|---|---|
| VERBAL INFORMATION<br>• Verbatim<br>• Non-Verbatim<br>• Substance | ATTITUDES<br>• Attitude Learning<br>• Attitude Changing | |
| INTELLECTUAL SKILLS<br>• Problem Solving<br>• Rule Using<br>• Defined Concepts<br>• Concrete Concepts<br>• Discriminations | MOTOR SKILLS<br>Executing a skilled motor performance | COGNITIVE STRATEGIES<br>Originating a novel solution to a problem |

Verbal information. This kind of training involved the information presentation of an area of knowledge. Information learning is described as "knowing that something is the case." It makes the trainee knowledgeable about something, in terms of knowing facts, but it does not ensure competence or concrete skill acquisition.

Intellectual skills. One of the more important goals of this training was to have the trainees become their own "problem solvers." The one sure way to achieve this, however, was to help each trainee attain less complex, lower level capabilities that were used in the process of solving problems. These capabilities made the learner competent. That is, she/he learned "how-to-do-something" in addition to just knowing facts. The subdomains of the intellectual skill domain called for a pure hierarchical relationship and included such skills as problem solving, rule using, defined and concrete concepts, as well as several discrimination skills.

Cognitive strategies: When engaged in cognitive strategy training, the instructors required the trainees to originate a strategy for the manipulation of information in order to approach a performance task. Cognitive strategies, unlike intellectual skills, required the trainee to look at information in a new way. The learners were encouraged to develop their own strategies, as internally organized skills for guiding and solving novel problems.

Motor skills. The attainment of motor skills or physical executions of specified behaviors was facilitated by the attainment of other types of behaviors, such as verbal information and several rules from the intellectual skills domain. Such attainment was tested through direct observation.

Attitudes. Attitude behaviors were characterized by choices made by the trainee with regard to persons, places, things, and ideas. Since attitude learning or un-learning is difficult to measure on-the-spot, it was not

reflected on explicit instructional goals. Any attitude change toward computer technology which happened during the training program can be attributed to human modeling (mostly from motivated peers), more facts about what computers can and cannot do as well as dispelling of the myth that one should be good in math to be good with computers.

## THE INSTRUCTIONAL STRATEGY

The strategy used by the trainers to prepare and conduct the training was based on a systems approach format (Dick and Carey, 1973). This was guided by the following steps for delivering instruction:

I. Preinstructional Activities
   1. Motivation
   2. Present the learner with the objective
   3. Remind the learner of prerequisite skills

II. Presentation
   1. Content presentation
   2. Examples and non-examples

III. Trainee Participation
   1. Practice
   2. Feedback

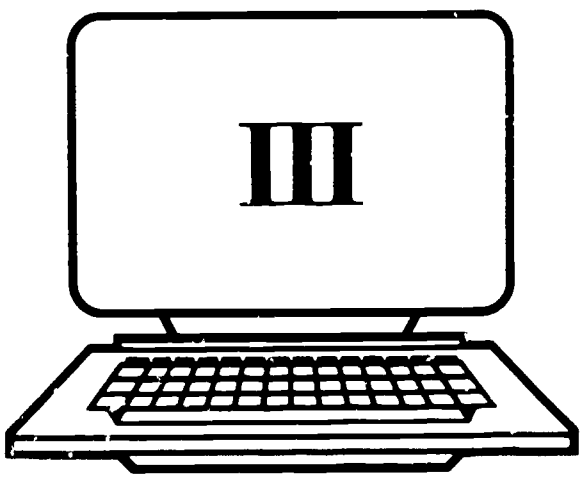
IV. Follow-through Activities
   1. Remediation
   2. Enrichment

## DURATION OF TRAINING

The computer literacy training was delivered in eight weeks between February-May, 1983. Two consecutive days of training were utilized to train a morning and an afternoon group of 24 trainees, in total. The first and last meeting were for orientation and closure, respectively, and the six in-between sessions, were for intensive training corresponding to the six curriculum goals or units of instruction.

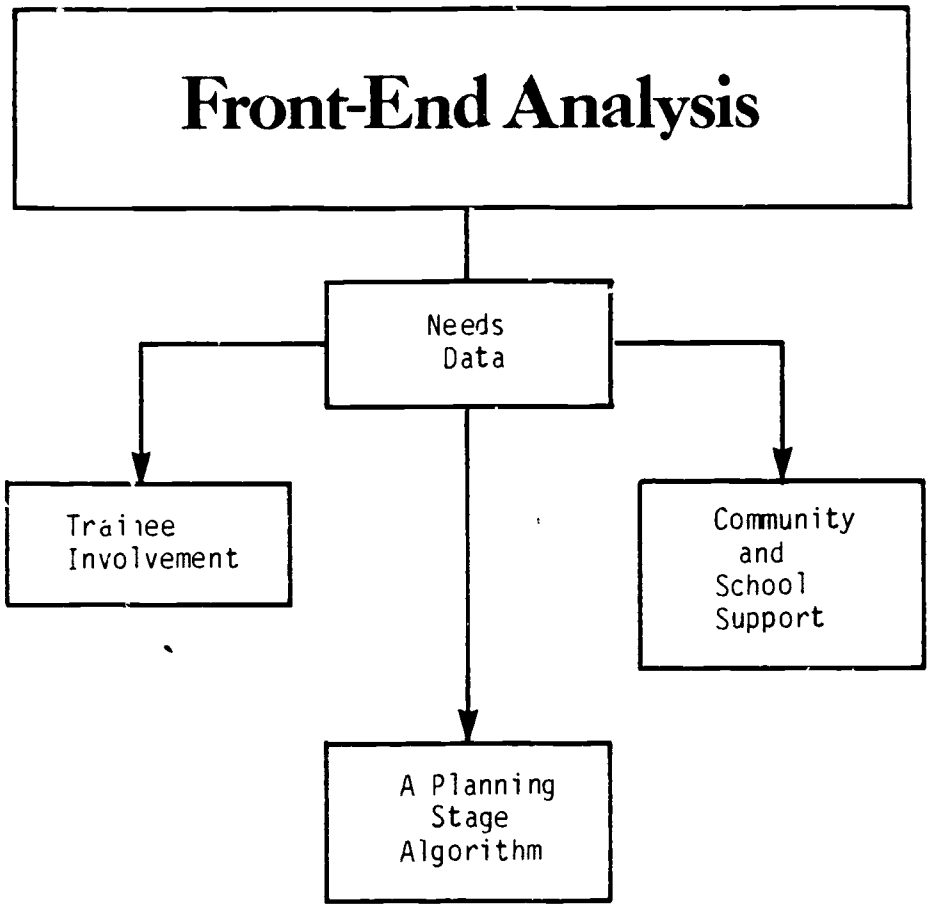
TRAINING AND CURRICULUM DEVELOPMENT TEAM

The two team members responsible for the instructional design and delivery of training are solely responsible for any comments, mistakes and possible discrepancies of this publication. For additional information and/or comments please contact Dr. Martha D. Mylona, and/or Dr. Theo Mantzanas, EDAC at Lesley College, 49 Washington Avenue, Cambridge, MA 02140. Phone: (617) 492-0505.



# III

# Front-End Analysis


Front-End Analysis
Needs Data
Trainee Involvement
Community and School Support
A Planning Stage Algorithm

## III. FRONT-END ANALYSIS

A needs analysis was the first critical step in identifying the content to be addressed during t short-term computer literacy training. This process helped in recognizing the discrepancies between the information and skills trainees have, versus the skills and information trainees should have had in order to perform successfully and to be more comfortable with microcomputers in their environment. Developing goal statements, prioritizing goals according to their perceived order of importance, and selecting most appropriate goals for training were also important parts of this phase. Of course, the adequacy of goals, instructional objectives, and activities were based on analysis of qualitative and quantitative responses alike.

### NEEDS DATA

### QUANTITATIVE AND QUALITATIVE DATA

Major quantitative needs assessment instruments included the Survey of Computer Literacy Training Needs as it appears in the Appendix section, and a Questionnaire (see Appendix I.2).

Qualitative variables for determining depth of learning/curriculum topics were derived from trainee knowledge, motivation, time constraints, hard and software availability as well as trainee expectations of "what they thought they would get out of the training program."

### TRAINEE INVOLVEMENT

Trainee involvement, for reasons well known to instructional design and training professionals, is a key to program success. The effort was deliberate to involve teachers and teacher assistants in the planning and decision making process.

The trainers met with the Silvia School teachers and their assistants for the first time to discuss the schedule, the content, and the delivery system of the training program. Two weeks prior to this meeting the trainers and assigned supervisory staff met with the Superintendent of Fall River schools and the director of Silvia School bilingual programs to review and administer needs assessment surveys. Results of surveys, in turn, were presented to the prospective trainees and each item was discussed in detail before voting for its inclusion or elimination. Overall learner control resulted in high morale, more reliable data on learning discrepancies, and a sense of responsibility for the success or failure of the program.

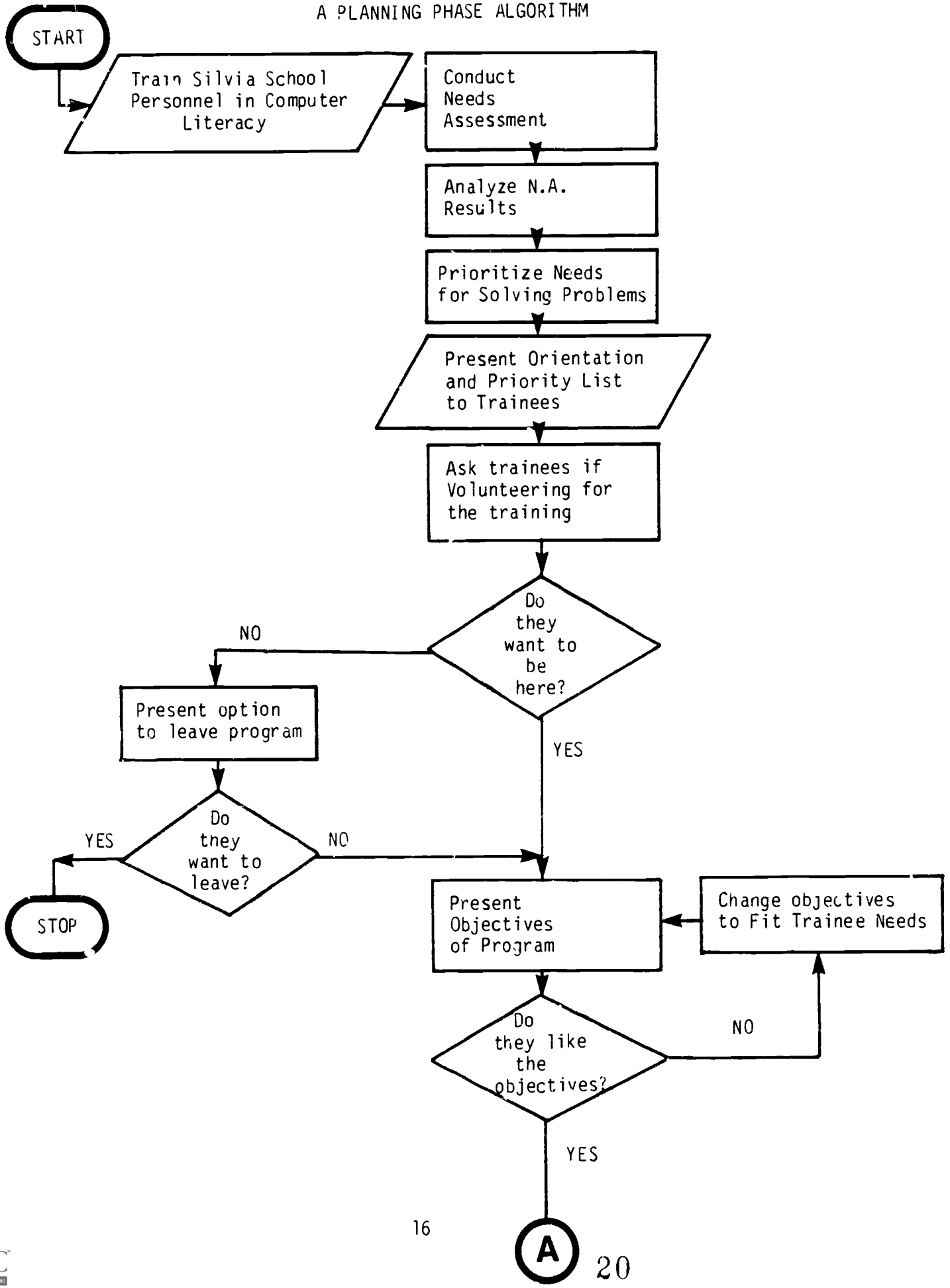
## COMMUNITY AND SCHOOL SUPPORT

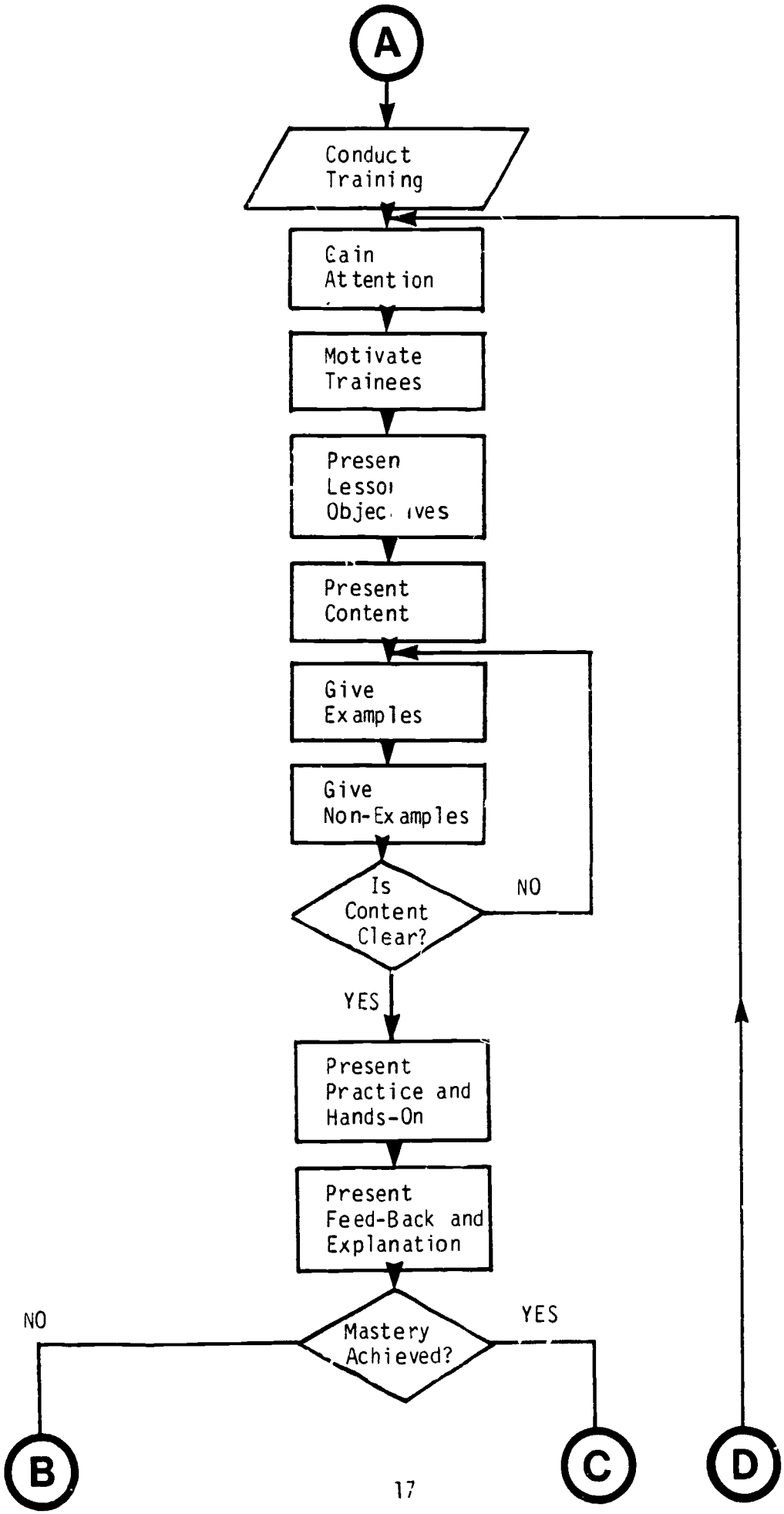
The Fall River community and individual parents of LEP children were also informed of the teacher training curriculum and they expressed their support through the superintendent of Fall River public schools (see Appendix section for relevant information).

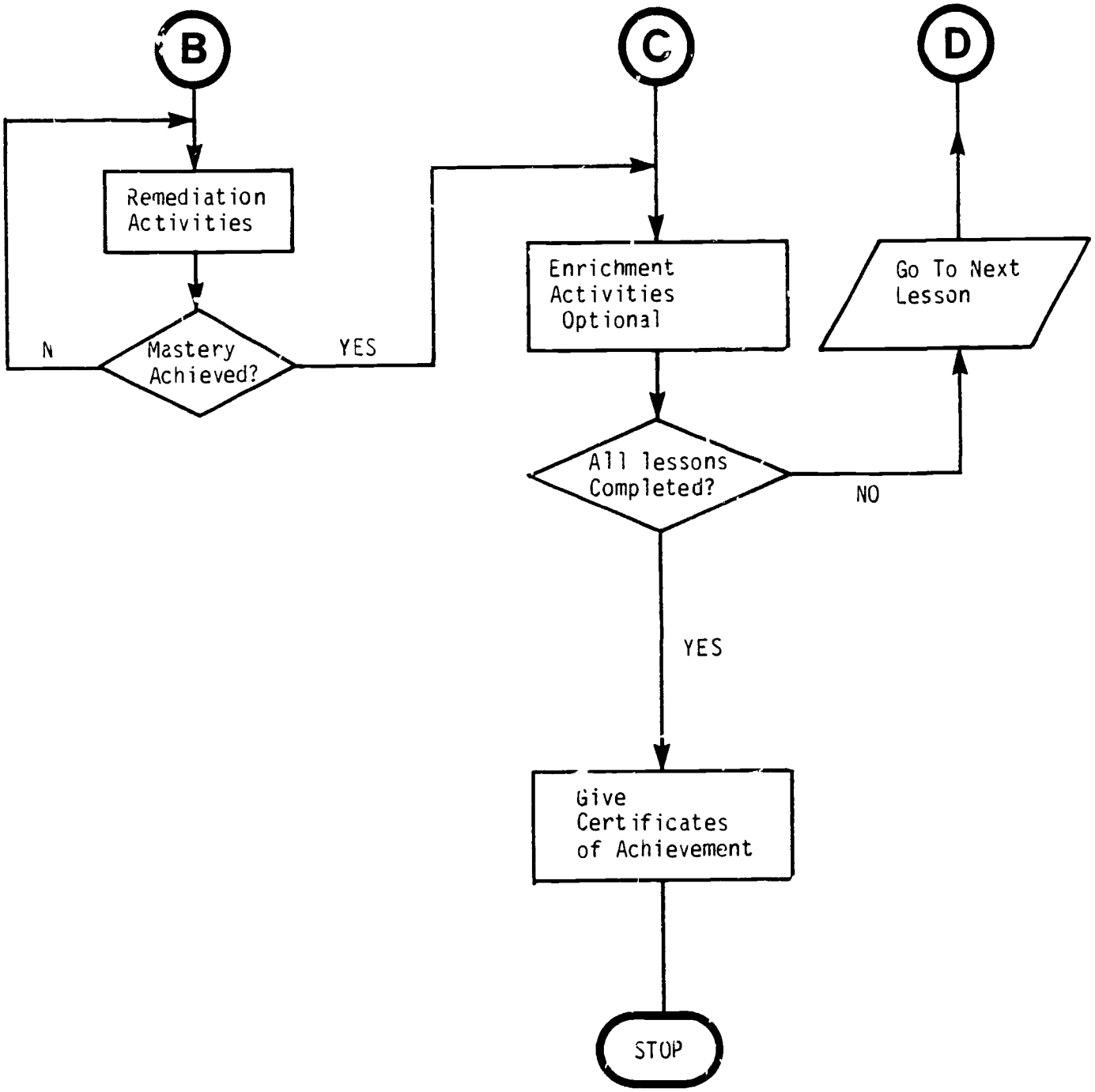
Other sources who provided input as to what should be included in the curriculum consisted of target school site administrators, three university professors who are involved with computers and issues of bilingual teacher training across the country, available literature on the state of the art of computer literacy training and expert advice from an EDAC staff whose role was to supervise the total training effort. Finally, the professional judgment of the two trainers was a major and unavoidable influence on all phases of planning, design, development, formative evaluation, and implementation of the short-term computer literacy curriculum.

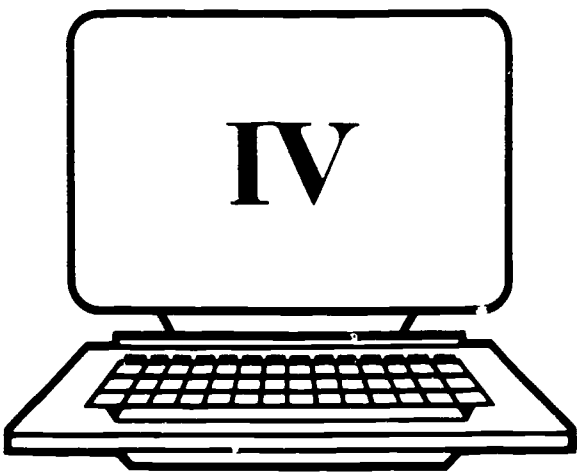
The following algorithm presents major milestones of the planning phase of the training.

A PLANNING PHASE ALGORITHM

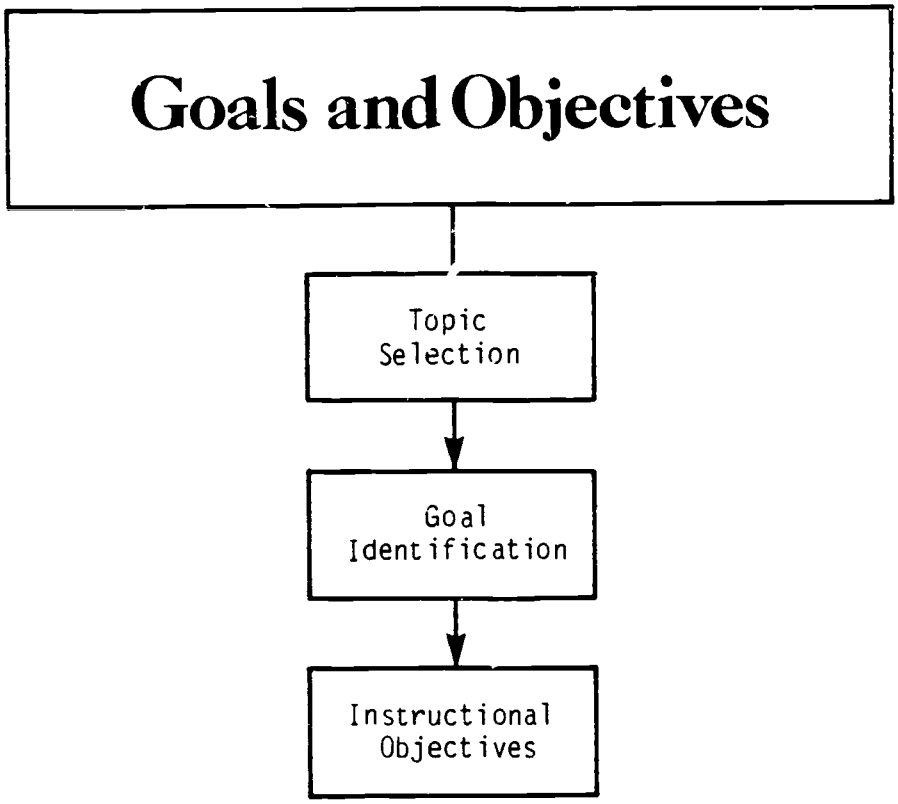



A
Conduct Training
Gain Attention
Motivate Trainees
Presen Lesso Objec ves
Present Content
Give Examples
Give Non-Examples
Is Content Clear?
NO
YES
Present Practice and Hands-On
Present Feed-Back and Explanation
Mastery Achieved?
NO
YES
B
C
D


B
C
D
Remediation Activities
Mastery Achieved?
N
YES
Enrichment Activities Optional
Go To Next Lesson
All lessons Completed?
NO
YES
Give Certificates of Achievement
STOP




# Goals and Objectives


Goals and Objectives
Topic Selection
Goal Identification
Instructional Objectives

## IV. GOALS AND OBJECTIVES

TOPIC SELECTION

Major topics selected to be covered in the computer literacy training program are as follows:

I. INTRODUCTION TO COMPUTER CONCEPTS: FUNDAMENTALS OF MICROCOMPUTERS

This introduction to computer literacy provides a working knowledge of the "buzzwords," history, and basic information to understand application capabilities and limitations of microcomputers.

II. ALGORITHMS AND PROBLEM-SOLVING

This session presents problem-solving opportunities, procedures, and tools. The ability to use and to develop algorithms is presented as a foundation to computer literacy, because, unlike people who can do things without analyzing each small detail, computers cannot function without procedures (algorithms).

III. OVERVIEW OF EDUCATIONAL APPLICATIONS: USING COURSEWARE

This session provides trainees with a coherent framework for understanding and assessing a broad range of potential uses of the microcomputer in the classroom. Presentation and laboratory sessions introduce trainees to important categories of computer based instruction.

IV. EDUCATIONAL TECHNOLOGY: PRODUCING COURSEWARE

This session introduces trainees to a systems approach to developing courseware. Instructional design steps and information necessary to plan, design, develop, and evaluate an instructional package are also explained.

V. ACQUIRING AND EVALUATING COURSEWARE

This session is designed to assist trainees amass a useful collection of computer programs. Sources of courseware reviews and actual hands-on experience in using the EDAC Courseware Evaluation Protocol are provided.

VI. COMPUTER LITERACY COMPETENCIES FOR K-6 STUDENTS

This session addresses the issues faced by teachers who want to implement a computer literacy program for their students in grades K-6. Trainees are expected to select/develop a list of computer literacy comptencies for grades K-6.

GOAL IDENTIFICATION

The needs-assessment and trainee involvement in the curriculum development decision-making process brought about the following realistic expectations which constitute the program's goals:

I. Skill and knowledge on how a computer works as well as ability to use and create computer applications that are helpful in teaching, learning, managing instruction, and problem-solving.

II. Skill and knowledge in developing algorithms and following logical step-by-step problem-solving procedures.

III. Skill and knowledge in using computer courseware for specific learning outcomes.

IV. Knowledge of what it takes to develop quality computer-based modules.

V. Skill in critical review of computer programs and ability to select and evaluate courseware for specific target users.

VI. Ability to identify students' computer literacy needs and transform those needs into curriculum competencies for grades K-6.

Implicit to the six goals, above, are attitudinal sub-goals that include the following:

- Developing a sense of control over the machines;
- Appreciation of the "analytical mind" and of necessary abilities to create procedural and hierarchical approaches in solving problems; and
- Appreciation of the role of computers in our information-oriented age, and home applications.

INSTRUCTIONAL OBJECTIVES

A list of instructional objectives necessary to achieve the training goals is presented below. The Roman numerals show the relationship of each objective to the instructional goal.

| INSTRUCTIONAL OBJECTIVE | INSTRUCTIONAL GOAL | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI |
| TWBAT* list the five computer generations and summarize the importance of the fourth and fifth generation to education. | x | | | | | |
| TWBAT state the definitions of "microcomputer," "CPU," "data," "hardware," "software," "RAM," "ROM," "Boot," "Power-up/Power-down," "Bit," "Byte," "I/O," "K," "Courseware." | x | | | | | |
| TWBAT recognize the synergetic and cybernetic relationship of four major computer parts and explain what they do. | x | | | | | |
| TWBAT identify major parts of a computer system by their correct names. | x | | | | | |
| TWBAT list and explain the basic functions of a computer. | x | | | | | |
| TWBAT demonstrate comparison of computer memory sizes. | x | | | | | |
| TWBAT classify devices as peripherals by using a definition. | x | | | | | |
| TWBAT list the functions of the modem. | x | | | | | |
| TWBAT list the two types of magnetic media used for mass storage as floppy and hard disk. | x | | | | | |
| TWBAT state the advantage of the floppy disk over audio and digital cassette tape storage. | x | | | | | |
| TWBAT demonstrate correct handling of a floppy disk and explain the hazards of mishandling it. | x | | | | | |
| TWBAT list the four major functions of an operating system. | x | | | | | |

*Trainee Will Be Able To

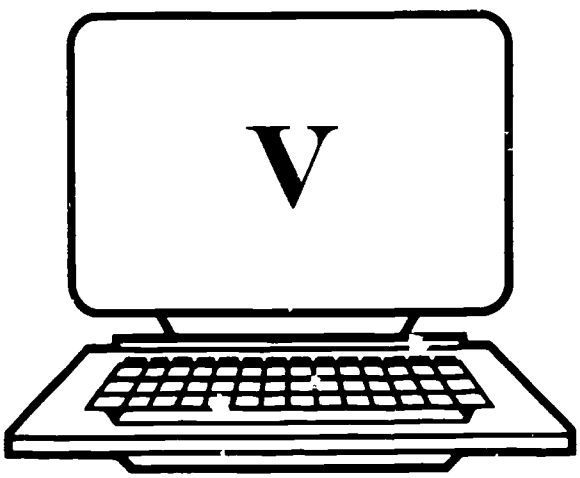
| INSTRUCTIONAL OBJECTIVE | INSTRUCTIONAL GOAL | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI |
| TWBAT state definitions of the terms "algorithm," "flow chart," "programming," "instructional design," "task analysis." | | x | | x | | |
| TWBAT summarize . process of developing courseware for educational applications. | | | | x | | |
| TWBAT identify flowchart symbols by their correct name and function. | | x | | | | |
| TWBAT list procedures that describe a familiar activity. | | x | | | | |
| TWBAT demonstrate application of procedures and related concepts to solve a given problem which is meaningful and important. | | x | | | | |
| TWBAT generate procedures to solve a new problem. | | x | | | | |
| TWBAT demonstrate trouble-shooting of errors in a given algorithm and propose correct procedures. | | x | | | | |
| TWBAT generate two different procedures to produce the same outcome. | | x | | | | |
| TWBAT demonstrate cold start-up using software. | x | | | | | |
| TWBAT demonstrate three ways of re-booting up the system. | x | | | | | |
| TWBAT demonstrate cold start without disk to get into immediate mode. | x | | | | | |
| TWBAT demonstrate three ways of exiting the system. | x | | | | | |
| TWBAT demonstrate changing disks. | x | | | | | |
| TWBAT state the definitions of "Drill and Practice," "Tutorial," "Educational Game," and "Simulation" programs. | | | x | | | |

| INSTRUCTIONAL OBJECTIVE | INSTRUCTIONAL GOAL | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI |
| TWBAT summarize the purposes of each of the four types of computer programs and their educational value. | | | x | | | |
| TWBAT demonstrate ability to use the Apple Writer word processing program. | | | x | | | |
| TWBAT generate a print-out by using Apple Writer to word process a statement on the advantages of word processing. | | | x | | | |
| TWBAT classify programs as tutorials, educational games, drill and practice and simulations by reading the covers of the courseware. | | | x | | | |
| TWBAT state that a computer is a general purpose machine that finds its instructions in the program. | x | | | | | |
| TWBAT list four characteristics of quality software development. | | | | x | x | |
| TWBAT list major instructional design phases or milestoness th· are necessary for developing courseware. | | | | x | | |
| TWBAT list the five domains of learning as described by the modern learning psychologist, R. Gagne. | | | | x | | |
| TWBAT state in a paragraph why clear behavioral objectives are directly related with the concept of accountability. | | | | x | | |
| TWBAT generate a clear behavioral objective using Gagne's 5-component format. | | | | x | | |
| TWBAT list the components of a clear behavioral objective. | | | | x | | |
| TWBAT demonstrate conversion of a poorly written objective into its behavioral form. | | | | x | | |
| TWBAT list the three major roles of the computer in education. | | | x | | | |

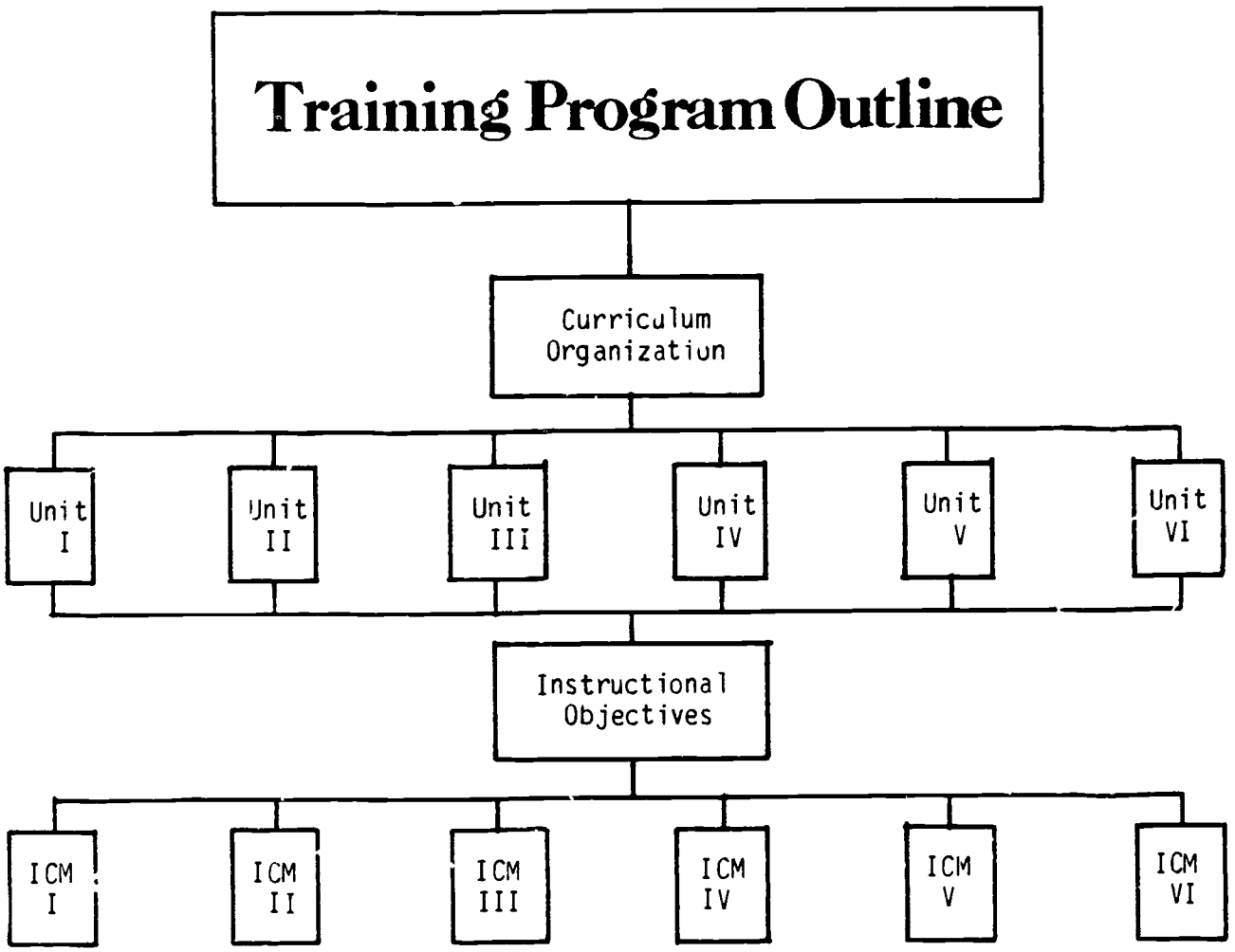
| INSTRUCTIONAL OBJECTIVE | INSTRUCTIONAL GOAL | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI |
| TWBAT list and describe the three phases of formative evaluation. | | | | x | | |
| TWBAT define formative evaluation. | | | | x | | |
| TWBAT state a definition of technical, content, and instructional quality of software. | | | | | x | |
| TWBAT recognize the meaning of questions asked by the EDAC Courseware Evaluation Protocol. | | | | | x | |
| TWBAT demonstrate use of the Protocol. | | | | | x | |
| TWBAT generate a critical review of a given software by using the EDAC Courseware Evaluation Protocol. | | | | | x | |
| TWBAT state the definition of Type I and Type II simulations. | | | x | | | |
| TWBAT list major advantages and disadvantages in using simulations in the classroom. | | | x | | | |
| TWBAT describe the role of computers in the target K-6 curriculum. | | | | | | x |
| TWBAT identify computer literacy discrepancies for K-6 target students. | | | | | | x |
| TWBAT demonstrate needs analysis for the target K-6 computer literacy curriculum. | | | | | | x |
| TWBAT generate instructional objectives which relate to each identified computer literacy goal. | | | | | | x |
| TWBAT classify computer literacy objectives under K-2, 3-4, and 5-6 grade levels. | | | | | | x |
| TWBAT generate a feasible integrated curriculum outline for target K-6 computer literacy competencies. | | | | | | x |
| TW choose to participate in parent-teacher advisory councils for K-6 computer literacy | Attitudinal objective* | | | | | |
| TW choose to review and select software for the school. | Attitudinal objective | | | | | |

| INSTRUCTIONAL OBJECTIVE | INSTRUCTIONAL GOAL | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI |
| TW choose to be involved in all staff development activities which deal with computer literacy/competency. | Attitudinal objective | | | | | |
| TWBAT list sources of software reviews from the commercial, public, and state/ federal domains. | | | | | x | |
| TW choose to tutor children on computer use after class hours. | Attitudinal objective | | | | | |
| TW choose to become an "educated consumer" and a critical reviewer of courseware. | Attitudinal objective | | | | | |
| TW choose to help students use and develop algorithms and step-by-step procedures to solve every-day problems. | Attitudinal objective | | | | | |

* As mentioned earlier, objectives dealing with the change of attitudes are embedded into the total training experience and they cannot be directly measured. They express a wish that the trainee will choose a personal action which reflects a positive attitude toward computers as a result of the training.




# Training Program Outline


Training Program Outline
Curriculum Organization
Unit I
Unit II
Unit III
Unit IV
Unit V
Unit VI
Instructional Objectives
ICM I
ICM II
ICM III
ICM IV
ICM V
ICM VI

## V. TRAINING PROGRAM OUTLINE

CURRICULUM ORGANIZATION: RELATIONSHIP OF LEARNING OUTCOMES

The scope and sequence of objectives is organized into six units. Each unit corresponds to each instructional goal, which in turn, reflects the initial topic descriptions generated by the trainees. This relationship of topics to goals to units to objectives is presented in the following pages.

Relationship of Learning Outcomes

Unit I

| Topic Description | Instructional Goal | Unit of Training |
|---|---|---|
| Introduction to Computer Concepts: Fundamentals of Microcomputers | Skill and knowledge of how a computer works and ability to use and create computer applications that are helpful in teaching, learning, managing instruction, and problem solving | Using computers as objects and tools of instruction. |
| Behavioral Objectives | | |

I.1. Given a request, the TWBAT list the five generations of computers and summarize the importance of the fourth and fifth generation of computers for education, in 2 minutes, with the assistance of the group.

I.2. Given a request, the TWBAT state the definitions of "microcomputer," "CPU," "data," "hardware," "software," "RAM," "ROM," "booting," "power-up/down," "bit," "byte," "I/O," "K," "courseware," in 10 minutes, without the assistance of the group, with 90% accuracy.

I.3.* Given class discussion, the TWBAT recognize the relationship of the four major computer parts as "synergetic" and "cybernetic", meaning that parts work together and at the same time independently of each other to produce an anticipated outcome. Time for this is variable.

I.4. Given a computer system and upon request the TWBAT identify major computer parts by pointing to them when he/she hears their name, in 1/2 minute, with 100% accuracy and without assistance.

I.5. Given a class assignment, the TWBAT list and explain the basic functions of a computer, in 5 minutes, in writing, with 90% accuracy and without any assistance.

I.6. Given different computer memory sizes and upon request, the TWBAT generate a comparison of computer memory sizes by explaining the advantages and disadvantages, in 2 minutes, with the assistance of the group.

I.7. Given a modem and upon equest, the TWBAT list all its functions, in 3 minutes, with 95% accuracy and without any assistance.

I.8. Given the term "magnetic media" the TWBAT list the two types of magnetic media used for mass storage as "hard disk" and "floppy disk," in 3 minutes, without any assistance and with 100% accuracy.

I.9. Given a request, the TWBAT state the advantage of the floppy disk over audio and digital cassette-tape storage in his/her own words, with assistance from the group in 2 minutes, and with 85% accuracy.

I.10. Given the term operating system, the TWBAT list its four major functions as Input/Output, Memory, CPU, and Files and Software Management, in 1 minute without any assistance and with 100% accuracy.

I.11.* Given a program disk the TWBAT demonstrate correct handling and explain the hazards of poor handling, in his own words, without any assistance.

I.12. Upon request, the TWBAT demonstrate cold start-up using software, without any assistance, by following all correct procedures in 1 minute, and with 100% accuracy.

I.13.* Upon request, the TWBAT demonstrate three or four different ways of re-booting up the system, with assistance from the group.

I.14. Upon request, the TWBAT demonstrate cold start-up without disk by getting into immediate mode, without any assistance in 1 minute and with 100% accuracy.

I.15. Upon request, the TWBAT demonstrate three ways of exiting the system, with the assistance of the group, in 2 minutes and with 100% accuracy.

I.16. Given a diskette and upon request, the TWBAT demonstrate correct way of changing disks, without any assistance in 2 minutes and with 100% accuracy.

I.17.* Given the question "Is a computer an intelligent object?" the TWBAT state that the computer is a general purpose machine that finds its instructions in the programs with no intelligence of its own, verbally, in his/her own words.

*Behavioral objectives such as this, with no specified time limit or criterion of performance will not be measured by formal criterion-referenced tests.

Unit II

| Topic Description | Instructional Goal | Unit of Training |
|---|---|---|
| Algorithms and Problem-Solving | Skill and knowledge in developing algorithms and following logical step-by-step procedures to solving problems. | Using and developing algorithms |

Behavioral Objectives

II.1. Given a request, the TWBAT state the definitions of "Algorithm," "Flow Chart," "Task Analysis," "Programming," and "Instructional Design," in 5 minutes, with the assistance of the group in 15 minutes and with 80% accuracy.

II.2. Given a mixed collection of symbols, the TWBAT identify those symbols associated with flow charting by putting a check mark and by saying their correct names, in 2 minutes, with 100% accuracy.

II.3. Given a familiar activity, like "washing face," the TWBAT list all procedures that describe the activity, in 2 minutes, with the assistance of the group and with 95% accuracy.

II.4.* Given a problem to be solved or a task to be achieved, the TWBAT demonstrate application of related concepts and procedures to reach results, with 95% accuracy, in variable time and with assistance from the group.

II.5. Given a task to be achieved, the TWBAT generate 2 different algorithms to produce the same results, in 15 minutes, with the assistance of the group, and with 100% accuracy.

II.6. Given an incomplete algorithm, the TWBAT demonstrate trouble-shooting by pointing out errors and recommending correct steps, in 20 minutes, with 85% accuracy.

II.7. Given the terms "hierarchical" and "procedural" the TWBAT state their definitions and explain their purposes and applications, without the assistance of the group, in 3 minutes, with 100% accuracy.

II.8. Given several flowcharts and the terms "hierarchy" and "procedure," the TWBAT classify all flowcharts under their correct category, in 5 minutes, without any assistance and with 95% accuracy.

Unit III

| Topic Description | Instructional Goal | Unit of Training |
|---|---|---|
| Overview of Educational Applications: Using Courseware | Skill and knowledge in using computer courseware for specific outcomes. | Using Courseware |

Behavioral Objectives

III.1. Given the term "computers in education," the TWBAT list the three major roles as computer literacy, computer programming, and computer based instruction, in 3 minutes, with 100% accuracy.

III.2. Given a request, the TWBAT state the definitions of "Drill and Practice," "Tutorial," "Educational Game," "Educational Simulations," verbally in 5 minutes, with the assistance of the group, and 100% accuracy.

III.3. Given the names of the four types of educational programs, the TWBAT summarize in his/her own words, the purposes of each type and their educational value, in 5 minutes, with the assistance of the group, and 85% accuracy.

III.4. Given the Apple Writer word processing master disk, one initialized floppy, a computer system with 2 disk drives and a printer, the TWBAT demonstrate ability to type a paragraph of text and to save the text on the RAM, with 90% accuracy, with no assistance, and in 20 minutes.

III.5. Given a document on file, its access name, and the Apple writer software in addition to computer, 2 disk drives, and a connected printer, the TWBAT demonstrate accessing the file and getting a print-out with the help of the group, in 10 minutes, with 95% accuracy.

III.6. Given a request, the TWBAT state the definition of a Type I and a Type II simulation, in 5 minutes, with the assistance of the group and with 95% accuracy.

III.7.* Given a classroom discussion, the TWBAT list major advantages and disadvantages of educational simulations with the assistance of the group in 2 minutes.

III.8. Given several courseware packages and the terms "Tutorial," "Drill and Practice," "Simulation," "Game," and "Word Processing," the TWBAT classify packages under their correct categories, in 5 minutes, with the assistance of the group, and with 95% accuracy.

III.9. Given an instructional need to be met, the TWBAT identify and propose the correct type of courseware, without any assistance in 10 minutes and with 90% accuracy.

Unit IV

| Topic Description | Instructional Goal | Unit of Training |
|---|---|---|
| Educational Technology: Producing Courseware | Knowledge of what it takes to develop quality computer-based instructional modules. | The systems approach planning, design, and develoment of courseware. |
| Behavioral Objectives | | |

IV.1. Given a request, the TWBAT list the instructional design milestones for courseware (print, software, non-print) as follows: Needs Analysis, Goal Identification, Instructional Analysis, Identification of Entry Skills, Writing of Performance Objectives, Developing Criterion-Referenced Tests, Developing an Instructional Strategy, Developing/Selecting Instruction, Designing and Conducting Formative Evaluation and Revising Instruction. In order to receive full credit, the trainee should list the above milestones in their correct order of sequence, within 5 minutes, without any assistance, and with 100% accuracy.

IV.2. Given the term "five domains of learning," the TWBAT list these, verbally, as verbal information, intellectual skills, cognitive strategies, motor skills, and attitudes, in any order, within 2 minutes, without any assistance, and with 100% accuracy.

IV.3.* Given the term "behavioral objective" the TWBAT summarize in a few sentences, why behavioral objectives are directly related to the concept of accountability and mastery learning.

IV.4. Given a domain of learning, the TWBAT generate one behavioral objective, in writing, in a five component format, in 10 minutes, with 95% accuracy, and without any assistance. (Any subdomain of the intellectual skills domain is also acceptable.)

IV.5. Given a poorly-stated objective, the TWBAT demonstrate conversion into its clear behavioral form, in 3 minutes, with the assistance of the group, and with 95% accuracy.

IV.6. Given a request, the TWBAT list the components of a clearly written objective as situation, capability verb, action, object, tools/constraints and criterion of performance, in 5 minutes, without any assistance, and with 100% accuracy.

IV.7. Given the term "formative evaluation," the TWBAT list and describe in a few words the 3 phases of FE as one-to-one, small-group, and field-trial, without any assistance, within 15 minutes, and with 95% accuracy.

IV.8. Given a request the TWBAT state a definition of formative evaluation with 80% accuracy, in 3 minutes and without any assistance.

Unit V

| Topic Description | Instructional Goal | Unit of Training |
|---|---|---|
| Acquiring and Evaluating Courseware | Skill in critical review of computer courseware and capability in matching types of courseware to learning outcomes and specific target population needs. | Becoming educated consumers of computer courseware. |
| Behavioral Objectives | | |

V.1.* Given a request, the TWBAT list characteristics of quality software development.

V.2. Given the terms "technical quality" "content quality," and "instructional design quality," the TWBAT state the definition of each term without any assistance, verbally, in 15 minutes, with 90% accuracy.

V.3.* Given the question "Where can one find software reviews?" the TWBAT list commercial, public, state/federal publications as the major software review sources, in 1 minute without any assistance.

V.4.* Given the EDAC Courseware Evaluation Protocol, the TWBAT recognize the correct meaning of each question with 85% accuracy.

V.5.* Given an educational program, its supportive materials and manual, and the EDAC courseware Evaluation Protocol, the TWBAT demonstrate correct use of the Protocol in reviewing courseware. Time is variable depending on length of program and trainees' self-pacing.

V.6.* Given a program and its completed EDAC Courseware Evaluation form, the TWBAT generate a short critical review of the package, in writing, within 20 minutes.

Unit VI

| Topic Description | Instructional Goal | Unit of Training |
|---|---|---|
| Computer Literacy Competencies for K-6 Students | Ability to identify student's computer literacy needs and transform needs into curriculum competencies for grades K-6 | Create a computer literacy curriculum for your students |

Behavioral Objectives

VI.1.* Given a request, the TWBAT summarize in his own words the role of computers in a K-6 curriculum, in a few sentences, within 2 minutes.

VI.2.* Given a group assignment, the TWBAT generate a definition of computer literacy which corresponds to the K-6 curriculum and individual student's needs, in writing, and within the limits of one paragraph, with the assistance of the group.

VI.3.* Given a request, the TWBAT identify students' needs in terms of computer literacy discrepancies, in 30 minutes, with the assistance of materials, group, and the training team.

VI.4.* Given a list of computer literacy needs for K-6 students, the TWBAT demonstrate a needs analysis by breaking each need down to specific learning discrepancies in 65 minutes with the assistance of the group and the training team.

VI.5.* Given results from a needs analysis, the TWBAT generate appropriate instructional goals, in 65 minutes with the assistance of the group.

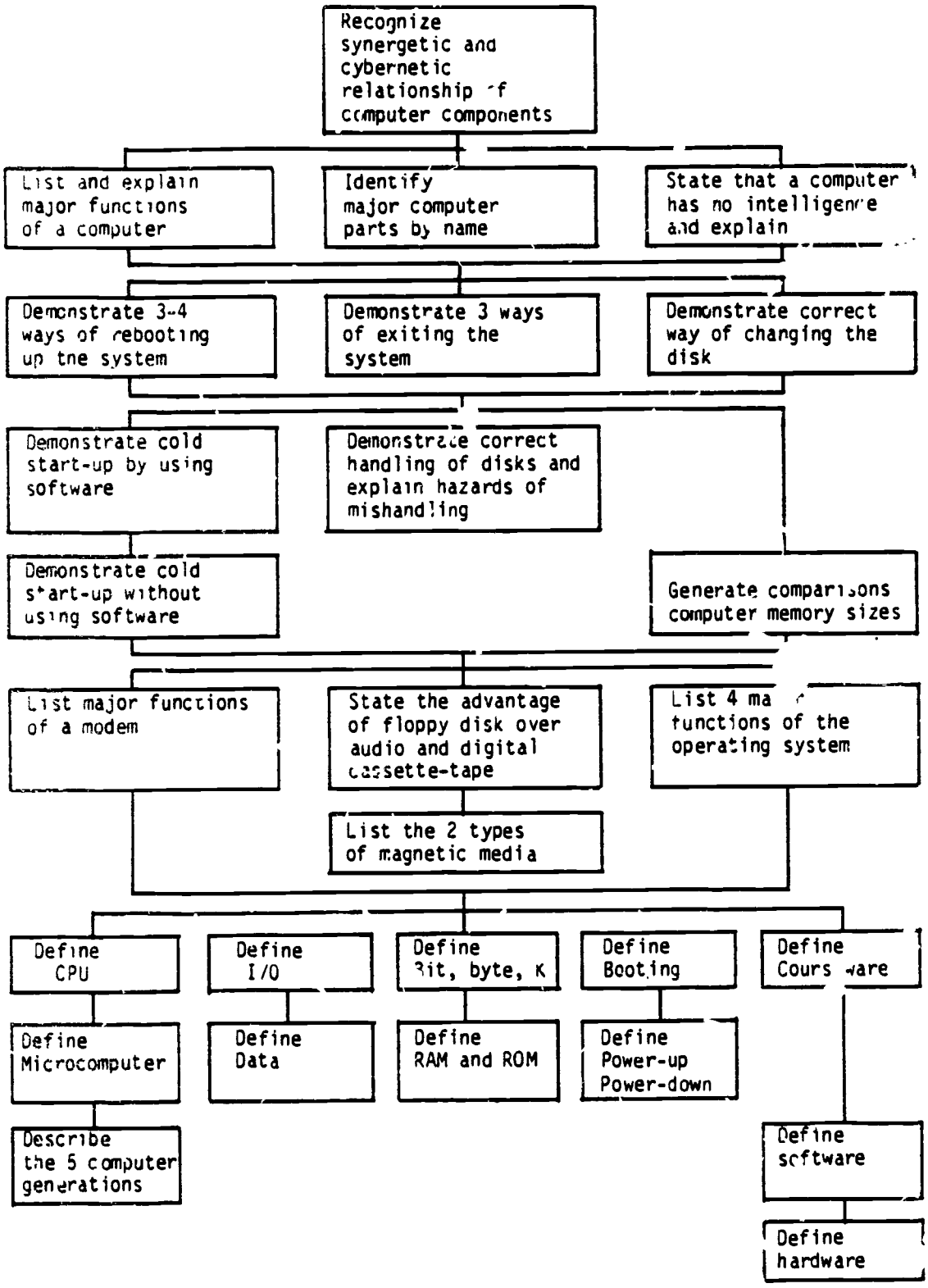
VI.6. Given a list of computer literacy goals, the TWBAT generate appropriate instructional objectives to achieve each goal, in writing, within 45 minutes.

VI.7.* Given a list of computer literacy objectives and grade level categories in terms of K-2, 3-4, 5-6, the TWBAT classify appropriate objectives under each grade in 30 minutes with the assistance of the group.

VI.8.* Given all data collected for the development of a K-6 computer literacy curriculum, the TWBAT generate a feasible integrated curriculum outline for K-6 computer literacy competencies with the assistance of the group.

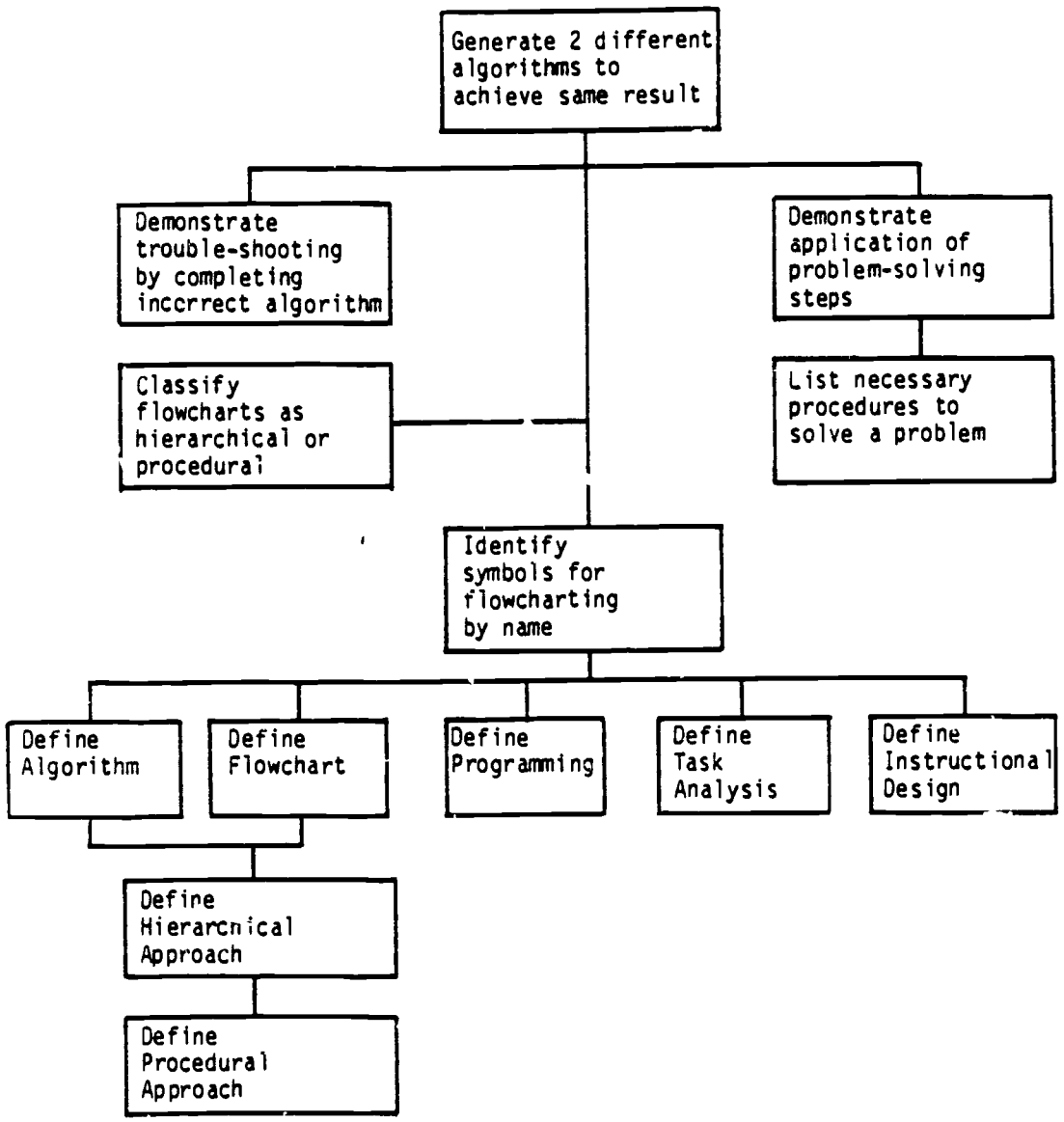
UNIT I. INTRODUCTION TO COMPUTER CONCEPTS; FUNDAMENTALS OF MICROCOMPUTERS

INSTRUCTIONAL CURRICULUM MAP I



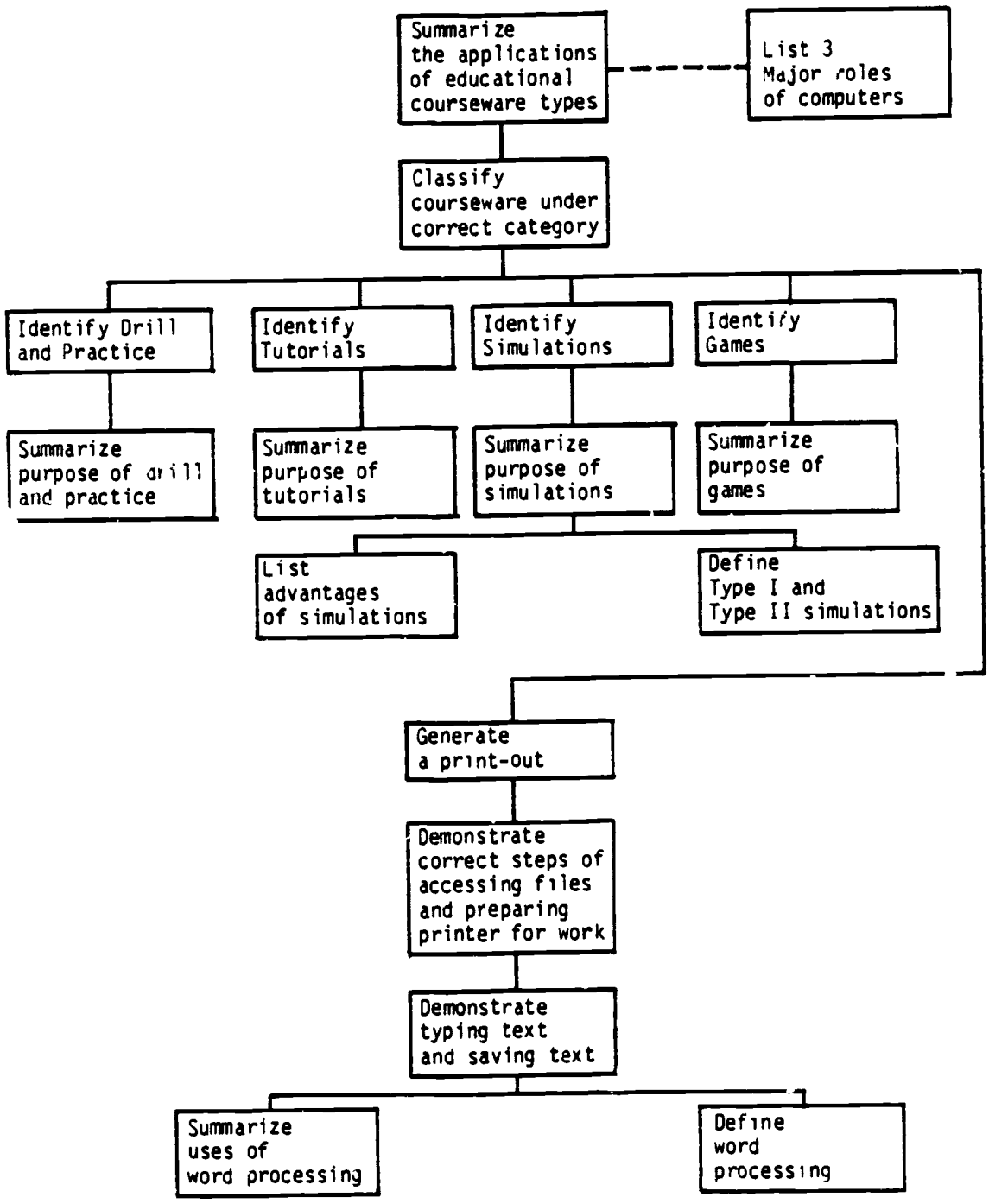
UNIT II. ALGORITHMS
AND PROBLEM-SOLVING

INSTRUCTIONAL CURRICULUM MAP II



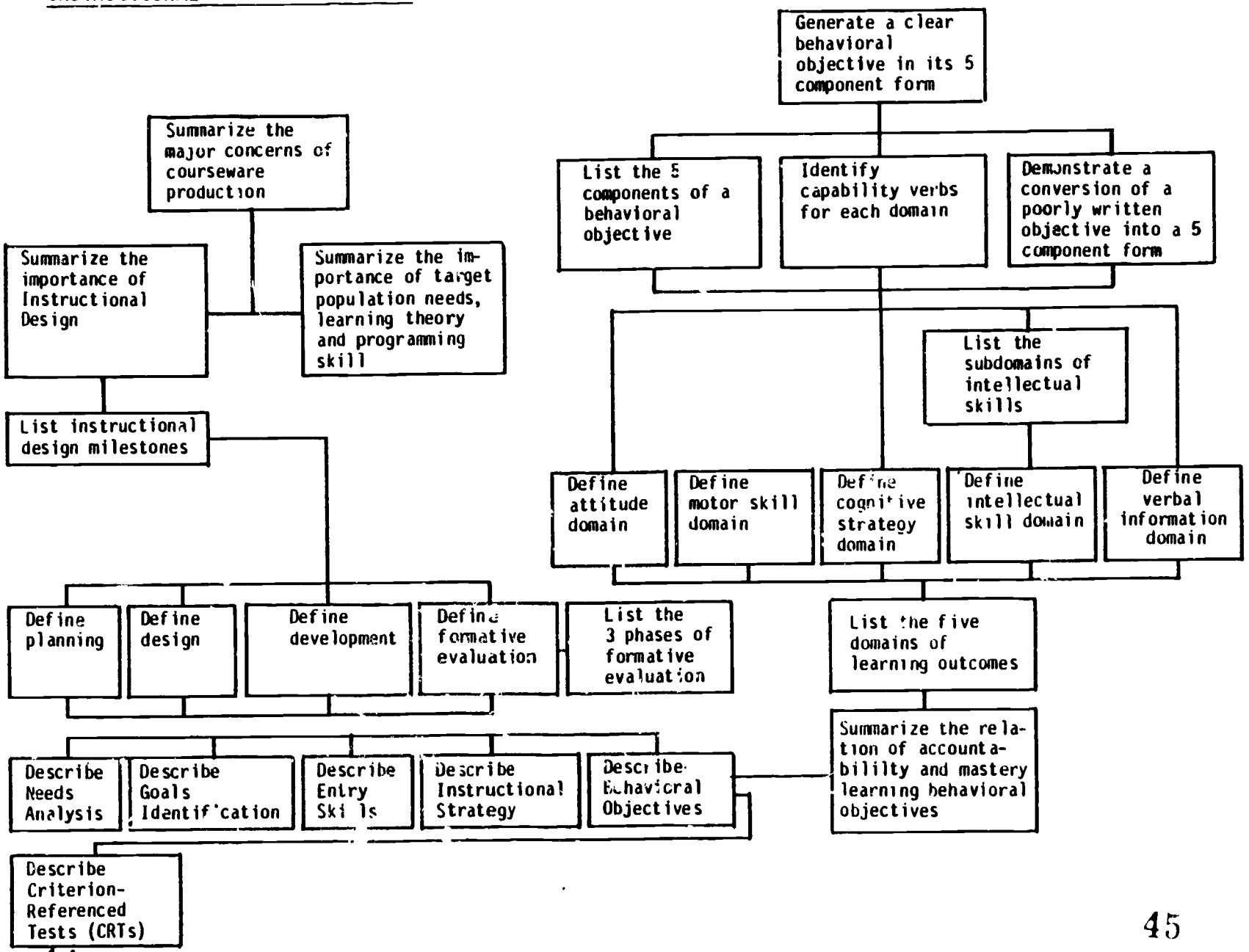
UNIT III. USING COURSEWARE

INSTRUCTIONAL CURRICULUM MAP III

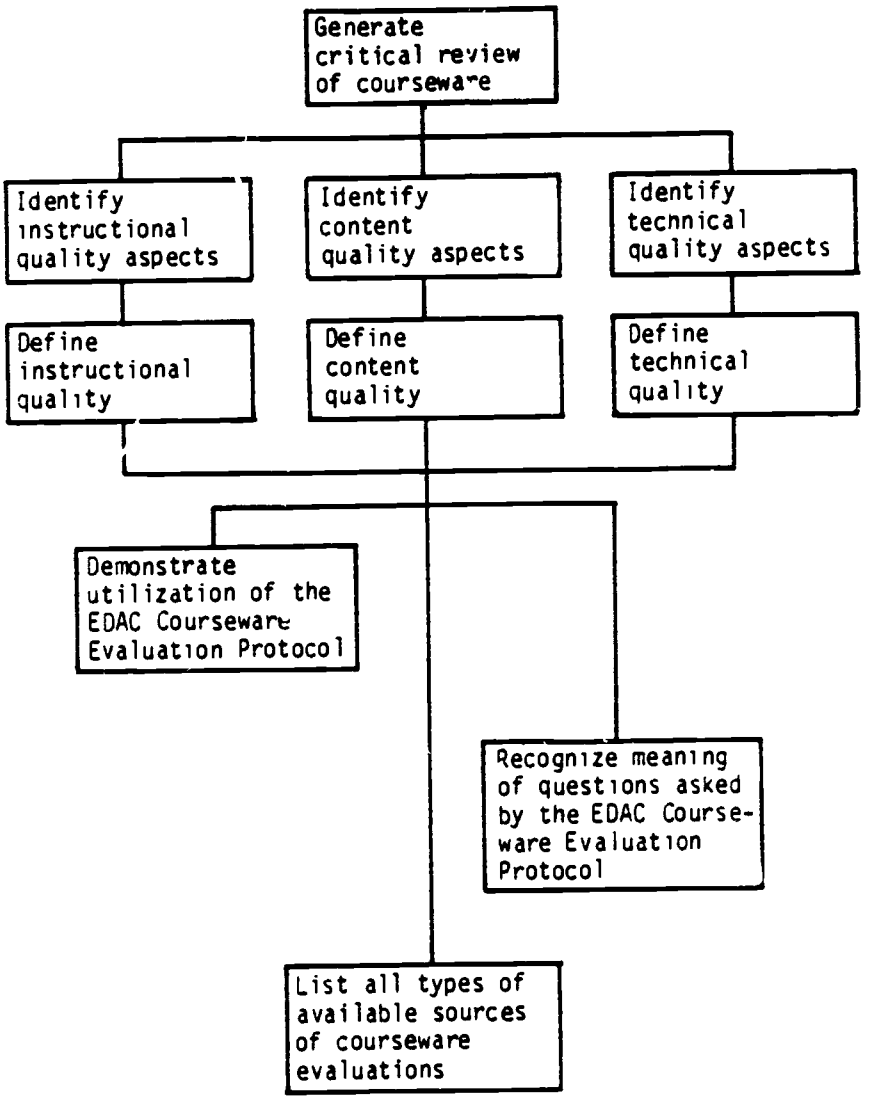


UNIT IV. PRODUCING COURSEWARE

INSTRUCTIONAL CURRICULUM MAP IV

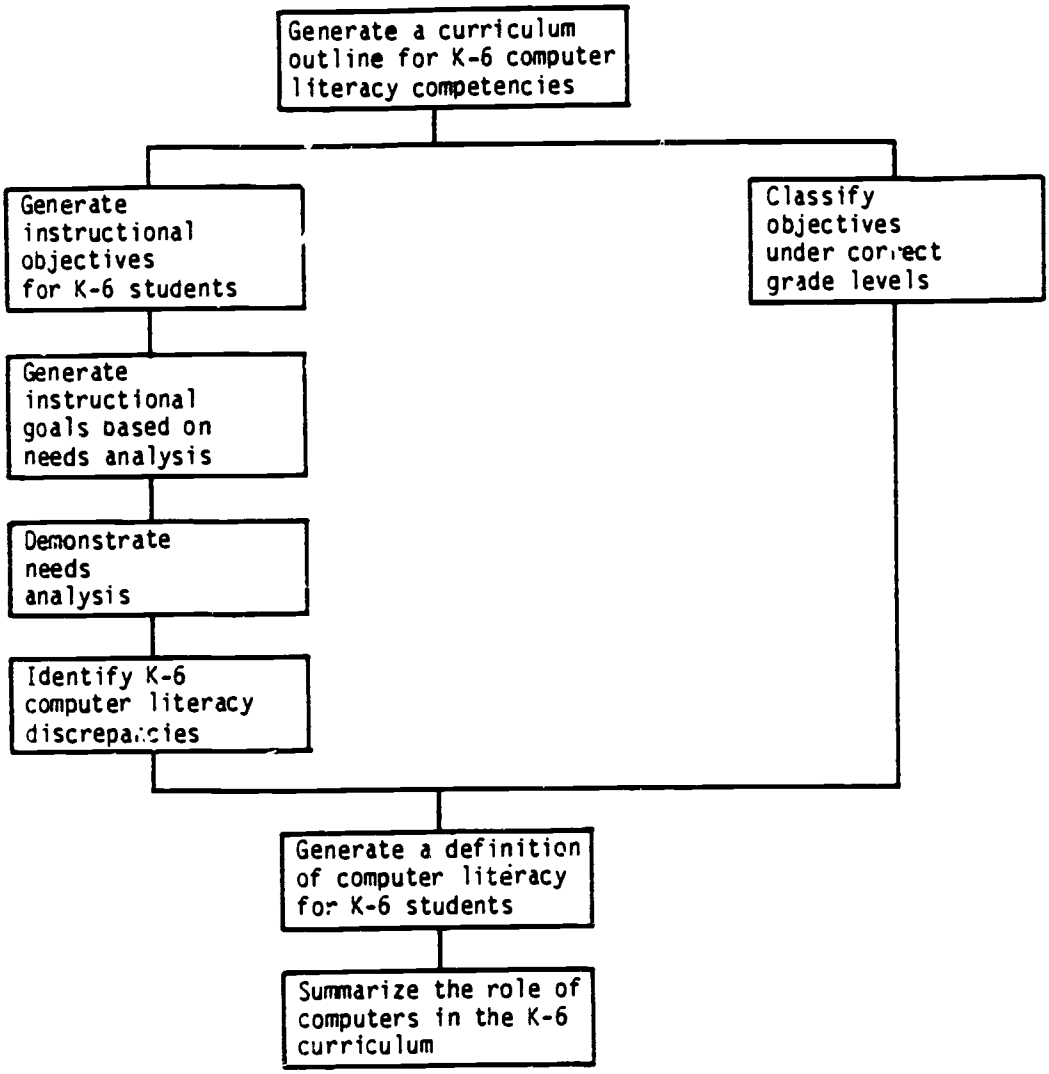


## INSTRUCTIONAL CURRICULUM MAP V



## UNIT VI. K-6 COMPUTER LITERACY COMPETENCIES

### INSTRUCTIONAL CURRICULUM MAP VI



# K-6 COMPUTER LITERACY CURRICULUM

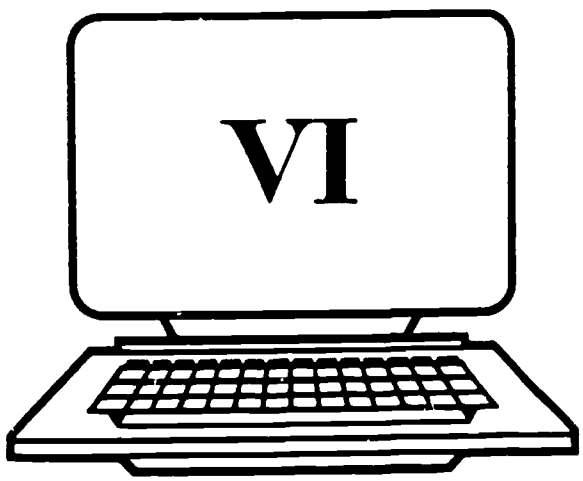
The following pages present the goals and objectives generated by the trainees as products of training unit VI. According to the Fall River site teachers and teacher assistants, the following competencies should be included in their K-6 computer literacy curriculum.

TRAINEE-GENERATED COMPUTER LITERACY OBJECTIVES FOR LEP STUDENTS IN GRADES K-6

| GOALS | OBJECTIVES | TOPICS | GRADE LEVELS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | K | 1 | 2 | 3 | 4 | 5 | 6 |
| Interact with a computer | Demonstrate ability to operate a computer | o Turning computer on and off | ● | ● | ● | ● | ● | ● | ● |
| | | o Using computer keyboard | ● | ● | ● | ● | ● | ● | ● |
| | Identify and select a program from the resource library | o Powering the computer system | ● | ● | ● | ● | ● | ● | ● |
| | | o Booting the system | | | ● | ● | ● | ● | ● |
| | Recognize user errors associated with computer utilization | o Word processing and printing of text | | | | | | ● | ● |
| Summarize the functions and uses of a microcomputer system | State appropriate terminology when communicating about computers | o Basic terms | ● | ● | ● | ● | ● | ● | ● |
| | | o Additional terms | | | | | ● | ● | ● |
| | Identify major computer functions such as input/ output, memory, processing | o I/O | | | | ● | ● | ● | ● |
| | | o Memory power | | | | | | ● | ● |
| | | o Processing | ● | ● | ● | ● | ● | ● | ● |
| | Recognize tasks for which computer utilization is appropriate | | | | | | | | |
| | Summarize major historical developments in computing | o 5 generations of computers | | | | | ● | ● | ● |

| GOALS | OBJECTIVES | TOPICS | GRADE LEVELS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | K | 1 | 2 | 3 | 4 | 5 | 6 |
| Demonstrate utilization of algorithmic processes in problem solving | Identify a logical sequence of steps needed to perform a task | o Giving directions to perform a task | ● | ● | ● | ● | ● | ● | ● |
| | | o Procedures for classifying objects by size, color, shape | ● | ● | ● | | | | |
| | Generate steps in solving a problem | o Locate objects in a grid | ● | ● | ● | | | | |
| | Identify the appropriate tools and procedures to solve a problem | o Diagram steps in a procedure | ● | ● | ● | ● | ● | ● | ● |
| | | o Flow charting | | | | ● | ● | ● | ● |
| | Generate systematic procedures to perform useful tasks in areas such as social studies, business and mathematics | o Generate a simple algorithm | | | | | ● | ● | ● |
| | | o Procedures and tools | | | | | ● | ● | ● |
| | | o Develop procedures for problem solving | | | | | | ● | ● |
| | Generate simple programs using an authoring language | o Task analysis | | | | | | ● | ● |
| | | o Apply procedures/ skills to new problems | | | | | | ● | ● |
| Recognize the impact of computer technology in our lives | Classify specific uses of computers in fields such as government, business medicine, industry, home, transportation, banking, and space exploration | o Describe computer applications | | | | | ● | ● | ● |
| | | o Compare computer occupations and careers | | | | | | ● | ● |

| GOALS | OBJECTIVES | TOPICS | GRADE LEVELS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | K | 1 | 2 | 3 | 4 | 5 | 6 |
| | Identify computer-related occupations and careers | o How computer technology is used in specific jobs | • | • | • | • | • | • | • |
| | Identify social and non-technical factors which might restrict computer utilization | o How computer technology is used | • | • | • | • | • | • | • |
| | | o Future uses | | | • | • | • | • | • |
| | | o The positive and negative aspects of computer applications | | | | | • | • | • |
| | Originate new implications of computer utilization | o Moral issues | • | • | • | • | • | • | • |




# Appendices

EDAC Lesley College
and
Fall River Public Schools

## A. SURVEY OF COMPUTER LITERACY TRAINING NEEDS

DIRECTIONS: Below is a list of areas of training. Please rate your need for training by "circling" the response that most closely corresponds to your assessment for each topic. If you answer "no need" on any topic, we would appreciate your stating your reasons why under "comments."

1. Being able to "program" in a computer language.
GREAT NEED SOME NEED NO NEED DON'T KNOW

2. Being able to get information in and out of a computer.
GREAT NEED SOME NEED NO NEED DON'T KNOW

3. Knowing how to select computer software.
GREAT NEED SOME NEED NO NEED DON'T KNOW

4. Understanding the different types of computers in use today.
GREAT NEED SOME NEED NO NEED DON'T KNOW

5. Being able to describe the activities of a computer in terms of its basic parts.
GREAT NEED SOME NEED NO NEED DON'T KNOW

6. Knowing something about the history and development of the computer.
GREAT NEED SOME NEED NO NEED DON'T KNOW

7. Knowing what a computer is and isn't.
GREAT NEED SOME NEED NO NEED DON'T KNOW

8. Knowing how to use the computer as a high-interest drill and practice vehicle.
GREAT NEED SOME NEED NO NEED DON'T KNOW

9. Knowing how to use the computer as a means of teaching problem solving skills.
GREAT NEED SOME NEED NO NEED DON'T KNOW

10. Knowing how to use the computer to help with class housekeeping chores (attendance records, student files, etc.).

GREAT NEED SOME NEED NO NEED DON'T KNOW

11. Knowing how to use the computer for instructional assistance.

GREAT NEED SOME NEED NO NEED DON'T KNOW

12. Knowing how to apply the computer to evaluate and diagnose students.

GREAT NEED SOME NEED NO NEED DON'T KNOW

13. Knowing how to use the computer to run simulations.

GREAT NEED SOME NEED NO NEED DON'T KNOW

COMMENTS: _____

_____

_____

_____

_____

B. QUESTIONNAIRE

A questionnaire, developed by Ronald E. Anderson, David C. Johnson, Thomas P. Hansen, and Daniel L. Klassen (1980) for the Minnesota Educational Computing Consortium, 2520 Broadway Drive, St. Paul, MN 55113, has been utilized to assess general knowledge, skill, and attitudes concerning computers. This questionnaire can be found in Annette Wright (see References).

EDAC Courseware Evaluation Protocol

PART I--DESCRIPTION

1. Program Title_____

2. Author and copyright date_____

3. Producer (publisher/manufacturer)_____

4. Program cost_____

5. For what grade level(s) or target audience?

   Producer's opinion_____

   Your opinion_____

6. Is instructional type specified by producer? Yes____ No____

7. Under which category would you classify the type of this instruction? (Check as many as apply)

   Drill & Practice ____
   Tutorial ____
   Simulation ____
   Game ____

   Other (please specify):
   _____
   _____

8. What kind of microcomputer is required by the program?

   Brand_____ Model_____ Memory_____

9. The minimum requirement for the monitor should be:

   Color_____ Black & White_____

10. Back-up/Copying Policy_____

PART II--TECHNICAL QUALITY

| N.A.* | Yes | No | | |
|---|---|---|---|---|
| ___ | ___ | ___ | 1. | Program runs effectively. |
| ___ | ___ | ___ | 2. | Program can be exited at any time. |
| ___ | ___ | ___ | 3. | Instructions can be reviewed at any time. |
| ___ | ___ | ___ | 4. | Cues for learner to input answer. |

| NA.* | Yes | No | | |
|---|---|---|---|---|
| ___ | ___ | ___ | 5. | Indicator to show where input will appear. |
| ___ | ___ | ___ | 6. | Random reinforcement. |
| ___ | ___ | ___ | 7. | Random generation of items. |
| ___ | ___ | ___ | 8. | Adequate time given to read each screen. |
| ___ | ___ | ___ | 9. | No more than 10 lines of text on each screen page. |
| ___ | ___ | ___ | 10. | Program collects and stores data. |
| ___ | ___ | ___ | 11. | Diagnoses learner's status based on performance. |
| ___ | ___ | ___ | 12. | Branching is based on student input and not just standard loops. |
| ___ | ___ | ___ | 13. | Sufficient information is given to operate program. |
| ___ | ___ | ___ | 14. | Comprehensive support materials available. |
| ___ | ___ | ___ | 15. | Program is reliable in normal use. |

* N.A. = not available or non-applicable

## PART III.--CONTENT QUALITY

| N.A.* | Yes | No | | |
|---|---|---|---|---|
| ___ | ___ | ___ | 1. | Program is relevant to subject matter. |
| ___ | ___ | ___ | 2. | Content challenges learner. |
| ___ | ___ | ___ | 3. | Content is free of stereotypes. |
| ___ | ___ | ___ | 4. | Level of difficulty is appropriate for learner. |
| ___ | ___ | ___ | 5. | Content is accurate and error-free. |
| ___ | ___ | ___ | 6. | Content matches each objective. |
| ___ | ___ | ___ | 7. | Content designed to be altered to fit learner needs. |
| ___ | ___ | ___ | 8. | Tests are congruent with lesson objectives. |
| ___ | ___ | ___ | 9. | Test alternatives available. |
| ___ | ___ | ___ | 10. | Content is motivating. |

*N.A. = not available or non-applicable

## PART IV--INSTRUCTIONAL QUALITY

| N.A.* | Yes | No | | |
|---|---|---|---|---|
| ___ | ___ | ___ | 1. | Attracts learner's attention. |
| ___ | ___ | ___ | 2. | Learner is informed of lesson objective(s). |
| ___ | ___ | ___ | 3. | Reminds learner of previous learning. |
| ___ | ___ | ___ | 4. | Content is supported by examples. |
| ___ | ___ | ___ | 5. | Learning is guided by examples followed by counter-examples. |
| ___ | ___ | ___ | 6. | Practice opportunities available. |
| ___ | ___ | ___ | 7. | Corrective, non-threatening feedback is provided immediately. |
| ___ | ___ | ___ | 8. | Assessment of overall performance is provided. |
| ___ | ___ | ___ | 9. | Retention and transfer are encouraged. |
| ___ | ___ | ___ | 10. | Remediation activities are provided when necessary. |
| ___ | ___ | ___ | 11. | Special effects are embedded in content. |
| ___ | ___ | ___ | 12. | Graphics enhance content. |
| ___ | ___ | ___ | 13. | High degree of learner participation |

*N.A. = not available or non-applicable

## PART V--SUMMARY COMMENTS

1. In your opinion, what are the major strengths and weaknesses of the program?

_____

_____

_____

_____

_____

NEWS RELEASE

# EDAC/Fall River Computer Literacy Training

The EDAC at Lesley College and the Silvia Public School in Fall River, Massachusetts, have implemented a model teacher training program in computer literacy.

John R. Correiro, Superintendent of the Fall River Public Schools, and Dr. Paul Liberty, Director of the EDAC at Lesley College, have joined forces to bridge a serious gap that exists between what teachers should know about computers and what they actually know.

According to Dr. Martha D. Mylona and Dr. Theo Mantzanas, program developers and trainers, the program presents an anxiety-free way to learn about computers as both tools and objects of instruction. Teachers and teacher assistants under the direction of Mr. Richard Pavao, Title VII Program Director at the Silvia School, met for two days a week for an intensive two-hour session each day. Two of the several characteristics that make this program successful involve high learner motivation due to the voluntary nature of attendance, and program objectives that reflect true individual needs derived from a pre-program needs assessment.

Comput literacy has been defined by the program participants as "the ability to [illegible] about, and to use an appropriately programmed computer to assist in learning, using and producing algorithmic procedures to solve problems, handling information, and making educated judgments about social and ethical issues associated with the computer technology."

Upon completion of the In-Service Computer Literacy Training (CLT), the teachers and teacher assistants (instructional force) will be able to:

1. Understand the fundamental concepts, history, buzzwords and capabilities/limitations of the computer.
2. Understand the role of the microcomputers in education as both objects of learning and tools of instruction.
3. Acquiring and evaluating educational courseware and making efficient, accurate decisions concerning courseware appropriateness for specific learners.
4. Organize and manage a computer-literacy integrated curriculum for learners in Grades K-6.
5. Produce algorithms and flowcharts to solve problems.
6. Understand the purposes and the making of educational simulations.

Among the attitudes througout the entire instruction are:

1. Appreciation of the computer capabilities.
2. Appreciation of the importance of learning about and using computers as tools.
3. Appreciation of the computer impact in societal and ethical issues.
4. Appreciation of the importance of logic and algorithmic procedures in the problem solving and decision-making process.

For more information about the EDAC/Fall River Schools Computer Literacy Training Program, contact:

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Cambridge, MA 02140

# CERTIFICATE OF PARTICIPATION

This certifies that

Participated in the

**Microcomputers in Education Training Program**

**sponsored by**

**EDAC/Lesley College and Fall River Public Schools**

**February–April 1984**
**Silvia School**
**Fall River, Massachusetts**

The program consisted of fourteen 2-hour sessions on Computer Literacy conducted by staff of the Evaluation, Dissemination and Assessment Center (an ESEA Title VII project) of Lesley College, Cambridge, Massachusetts.

Superintendent, Fall River Public Schools

Director, EDAC/Lesley College

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